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HE Wooden BARREL MANUAL

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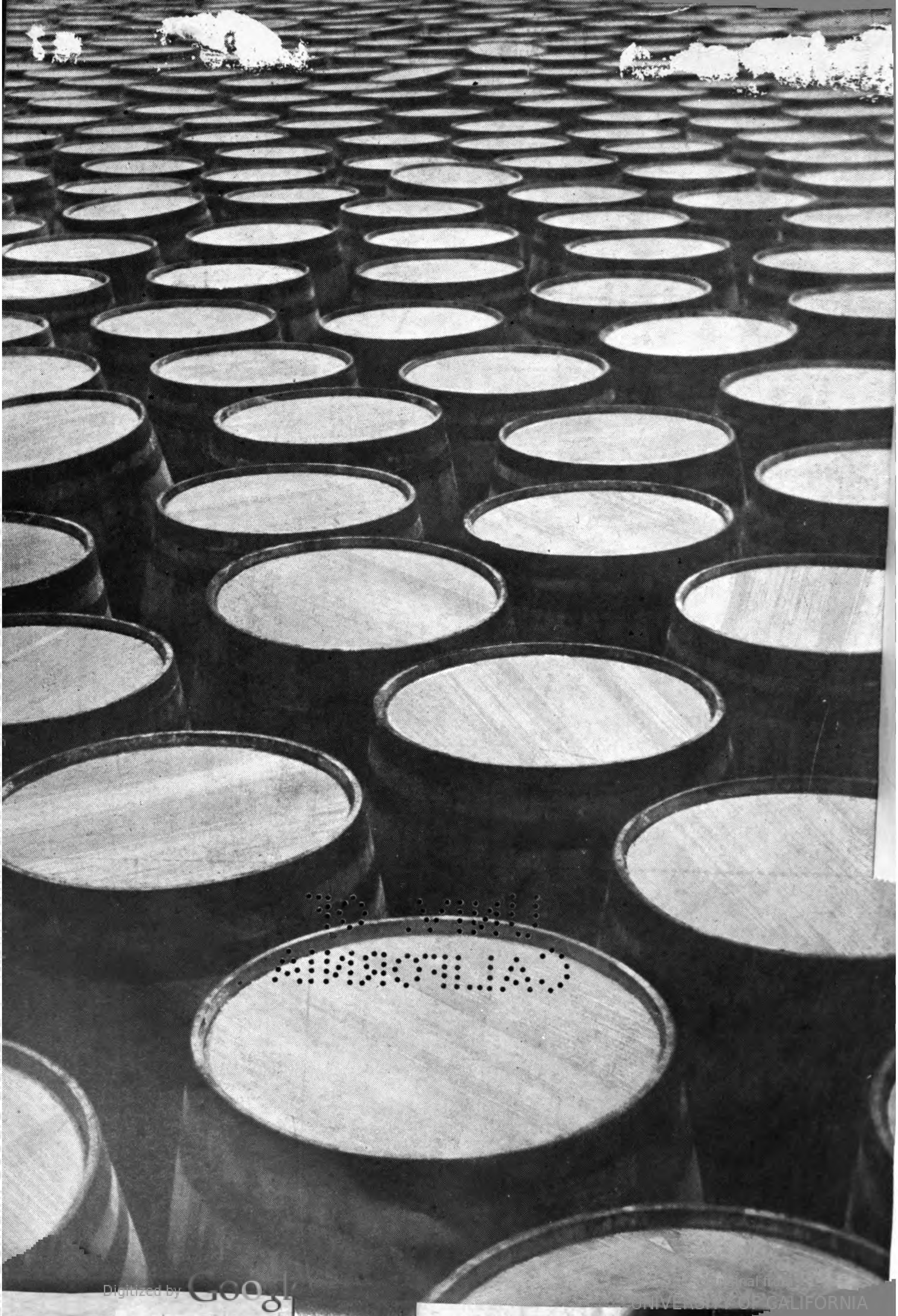

THE ASSOCIATED COOPERAGE INDUSTRIES
OF AMERICA, INC.
St. Louis 2, Mo.

March 15, 1944

Gentlemen:

In response to many requests for various kinds of information concerning wooden barrels, we have compiled a "Manual" and enclose copy.

We have endeavored to include all essential cooperage data in this "Manual" but you may find some questions unanswered because of possible oversight on our part or because of pending changes in specifications by the Government for both domestic and export shipment. However, do not hesitate to ask us, or ask your cooper, for any further information that will help you.

The "Manual" is furnished without charge to all who are interested. If you can use additional copies to advantage, fill out and return the order form below.

Yours very truly,

Ira H. Hoffner

President.

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FOREWORD

A wooden barrel is a uniformly bulging, cylindrical container, of greater length than breadth, made of wooden staves bound together with hoops and having two flat ends or heads of equal diameter.

Barrels and kegs are made in sizes ranging from one to sixty gallons capacity. They are separated into three main categories: SLACK BARRELS—For the shipment and storage of powders, semi-solids and solids. TIGHT BARRELS—For the shipment and storage of liquids, semi-solids and heavy solids. BEER BARRELS—For the shipment, storage and dispensing of malt beverages.

The wooden barrel is a strong, sturdy, economical package. Treat it right and it will give you the ultimate in satisfactory service.

Warning

Barrels are made in a variety of sizes. They are made out of many different woods and combinations of woods. Their hoops can be steel, wire or wood, and the hoops vary in number according to the size of the package or the product to be held. Some barrels are unlined; some are lined or "sized." There are several kinds of linings or sizings.

> ***If you want satisfactory service from your cooperage, never buy barrels without consulting your cooper! Take him into your confidence. Ask his advice. He is an expert on packaging and glad to serve you.***

Don't just buy barrels. Let the cooper prescribe the exact barrel to solve your packaging problem. If there isn't a cooper in your vicinity, or if you have a new product to pack, write to the trade association of the cooperage industry: The Associated Cooperage Industries of America, Inc., 408 Olive Street, St. Louis, 2, Missouri.

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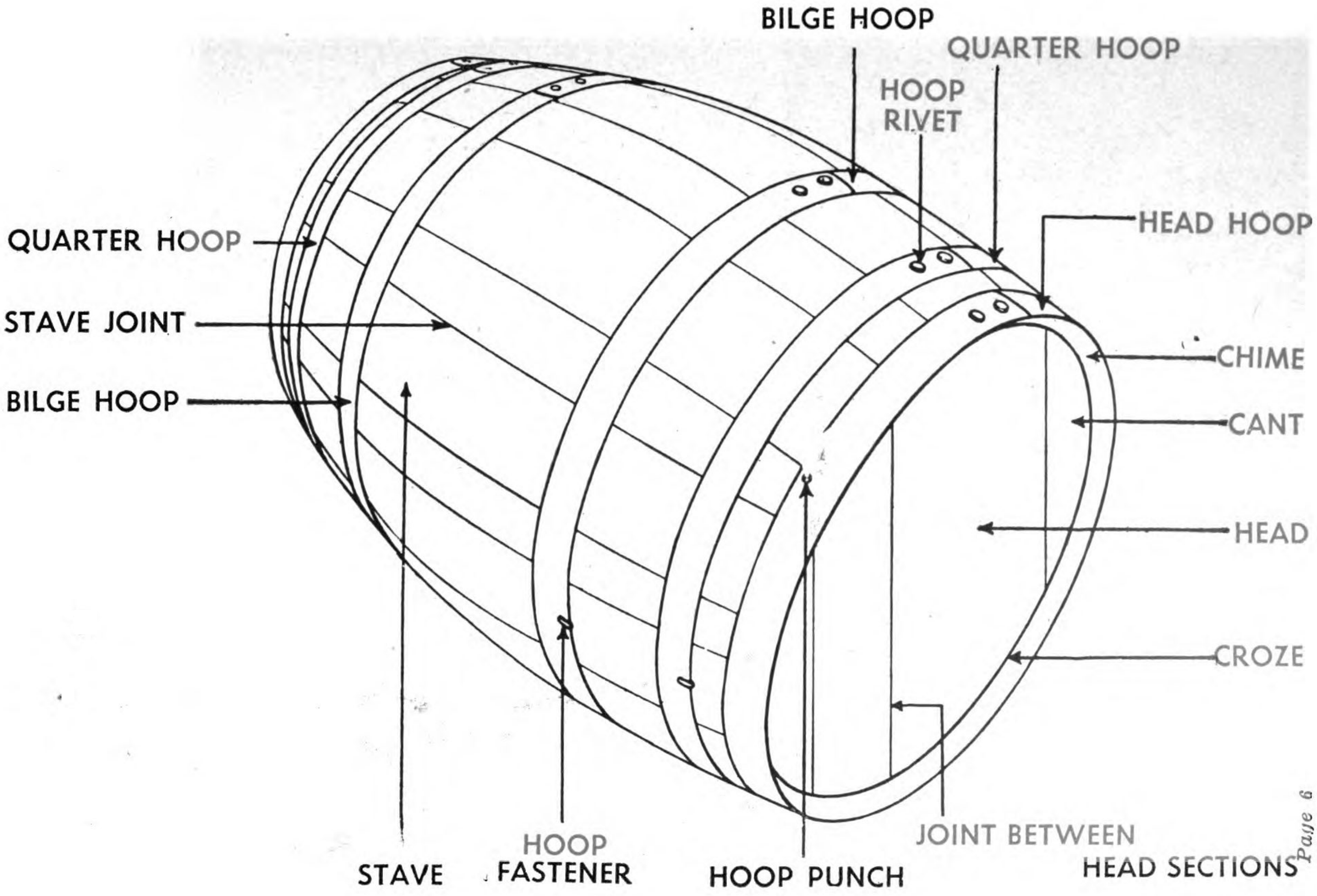
THE *Slack* BARREL


BILGE HOOP
QUARTER HOOP
HOOP RIVET
QUARTER HOOP
HEAD HOOP
STAVE JOINT
BILGE HOOP
CHIME
CANT
HEAD
CROZE
STAVE
HOOP FASTENER
HOOP PUNCH
JOINT BETWEEN HEAD SECTIONS

SELECTING THE PROPER BARREL

General Rules

Selecting the proper barrel for the product you plan to pack is vitally important. The wrong barrel for a product can cause many packaging headaches, to say nothing of loss of product.

Slack barrels are made in a number of sizes; they are made from a variety of woods. Some are tongued and grooved, others are not; some have beaded steel hoops (Figure 1), others wire hoops (Figure 2), others wood hoops (Figure 3), or a combination of the three; some are lined, others are unlined; some are siftproof, others are not.

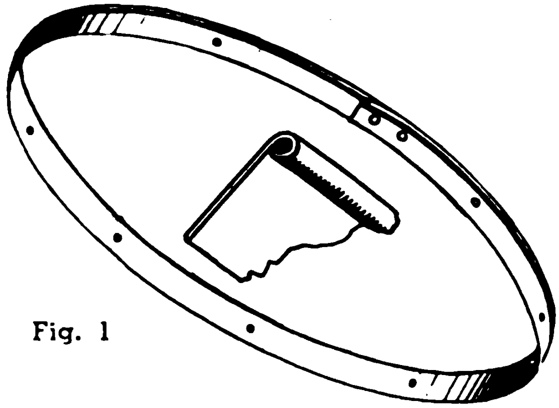


Fig. 1

The importance of selecting the proper barrel for your product can be easily illustrated. If you are packing certain food products, for instance, some woods may impart taste and odor to the products, and should be avoided. Pine is one wood that tends to impart taste and odor to certain foods, and should not be used for these foods.

The weight of the contents of a barrel and the conditions of shipment also have an important bearing on selection of the proper barrel. Truck shipment, for instance, is easier on the package than railroad shipment. Export shipments tend to cause more damage than domestic shipments, etc.

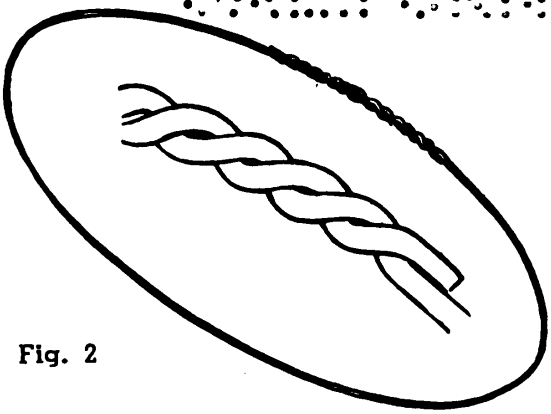


Fig. 2

Standard Barrels

No. 1 BARREL: The No. 1 barrel heads the slack barrel family. It is made out of No. 1 grade staves and No. 1 grade heading (See Grade Rules and Specifications, Page 20). The staves may be either tongued and grooved (Figure 4), or plain jointed. The heading is either tongued and grooved and glued or butt jointed and glued, or plain jointed (cant). Where the utmost in protection against sift-

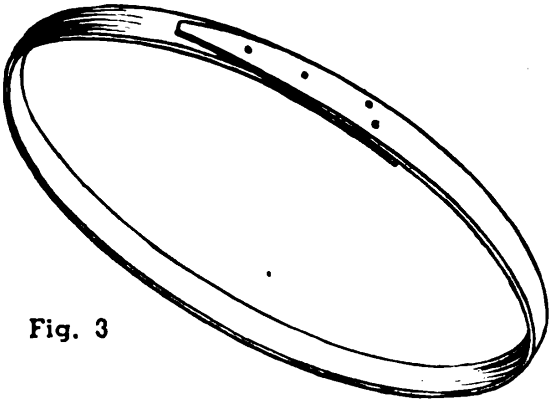


Fig. 3

ing, contamination and moisture is desired, the No. 1 tongued and grooved slack barrel with a bag liner (See Page 34) should be used. This barrel is adapted to such products as powdered milk, dried eggs, high priced chemicals, sugar, salt, spices, etc. In Government purchases for export of dried milk, cleats must be used (See Export Specifications, Page 31, and Cleats, Page 31).

The No. 1 barrel also is made with plain jointed staves and cant heads. This barrel can be used with a bag liner or not, as desired. It is used for such products as chemicals, soap chips, soap powders, granulated lime, dry paints and similar commodities. In the case of soap chips and soap powders and some chemicals, some firms request the plain jointed No. 1 barrel without liner, so the product can "breathe."

No. 2 BARREL: The No. 2 barrel employs staves and heading which are No. 2 grade (See Grade Rules and Specifications, Page 20). The staves may be either tongued and grooved or plain jointed, and the heading is usually plain jointed. This barrel is used largely for hardware, valves, fittings, hinges, low grade chemicals and for products where the sturdiness of the package is important. It should not be used for products where contamination and sifting must be avoided.

MEAT AND POULTRY BARREL (Figure 5): This barrel is made of No. 2 staves and No. 2 heading, usually with 2 wood and 4 wire hoops. It is used for packing turkeys, ducks, chickens, pork, beef, etc., and is generally made with a single head, top open.

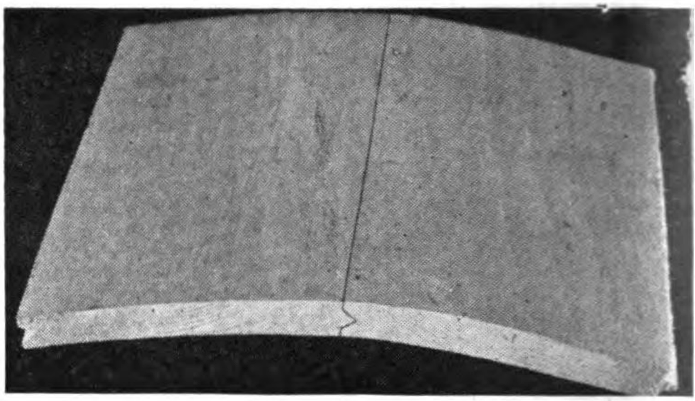


Fig. 4

GLASS AND POTTERY BARREL: This barrel is similar to the meat and poultry barrel, except that it is a double headed barrel.

POTATO BARREL: The potato barrel usually is made of pine or hardwood staves, plain jointed, with pine or hardwood head, plain jointed. It usually is made with 2 wood and 4 wire hoops, 4 wood and 2 wire hoops, or 6 wood hoops.

APPLE BARREL (Figure 6): The apple barrel is made of hardwood or pine staves, plain jointed, with hardwood or pine heading, plain jointed. It usually has 6 wood hoops, or 2 wood and 4 wire hoops.

FISH BARREL: The fish barrel is a No. 2 barrel with one or two heads, depending on the customer demand. It can be made with various combinations of hoops, and is used for packing fish and other seafood.

VEGETABLE BARREL: The vegetable barrel is made with No. 2 staves and heading, usually with 6 wood hoops.

NAIL AND SPIKE KEGS: These usually are made of pine staves and pine heading, with 2 steel and 2 wire hoops. They can be obtained in a number of sizes and are used for bulk shipment of nails, spikes, bolts, nuts and similar products.

Slack barrels and kegs are made in a number of sizes. Before buying any barrel for your product, consult your cooper.

Heavy Weights

In general, a well-made, properly-dried slack barrel can be expected to carry up to 400 pounds of dry products in the domestic trade, if handling and shipping conditions are satisfactory. Barrels for these heavy weights are best made of kiln-dried, tongued and grooved elm, hackberry or gum staves. Elm is less brittle than gum and other timber when thoroughly kiln-dried. For heavy weights, the maximum head size should be 19⅛ inches in diameter. For extra strength, the barrel should have six hoops instead of four. Beaded steel hoops of the proper gage undoubtedly provide the greatest strength. Wood hoops sometimes offer more protection to the chime than steel hoops, but they cannot be driven as hard as steel, and do not make as tight a barrel.

Fig. 5

Fig. 6

If the barrel for heavy weights must be sift-proof, glued or one-piece heading is of value. The one-piece head will not spring or give with weight as easily as the multi-piece or ordinary slack head.

If excessive weights are to be packed, or if the barrel is to be used for export shipment, cleats or head-liners may be indicated (See Pages 25, 26, 31 and 35).

Explosives and Dangerous Articles

The shipment of explosives, inflammables and dangerous articles is governed by rules laid down by the Interstate Commerce Commission and the Bureau of Explosives of the Association of American Railroads.

It is a penal offense to ship in interstate commerce any designated explosives, toxic or otherwise dangerous articles, except in accordance with I. C. C. regulations. Consult the railroads and the I. C. C. before making such shipments.

Explosives under these regulations are classified in three groups, in accordance with the transportation risks involved.

"Dangerous explosives" include ammunition for cannon, explosive bombs and projectiles, explosive torpedoes, dynamite and similar high explosives, black powder, blasting caps, chemical ammunition, detonating fuses, fulminates, and explosive grenades.

"Less dangerous explosives" include articles which have a fire rather than an explosion hazard, such as smokeless powder for cannon and small arms, ammunition for cannon without explosive projectiles, and fireworks.

"Relatively safe explosives" include caps, squibs, primers, and small-arms ammunition.

"Other dangerous articles" include such products as inflammable liquids, inflammable acids, oxidizing materials, corrosive liquids, compressed gases and poisonous substances.

The Interstate Commerce Commission regulations govern "packing, marking, loading, handling while in transit, and the precautions necessary to determine whether the material when offered is in proper condition for transport."

Slack barrels may be used for several of these explosive and dangerous articles. However, never ship any of these products without consulting the railroads and the I. C. C.

Every shipper of explosives and other dangerous articles should have a copy of Agent Topping's Tariff No. 4. This may be obtained by writing to W. S. Topping, Agent, 30 Vesey Street, New York, N. Y.

Consult Your Cooper

Before ordering slack barrels to pack any product, the safest rule is to consult your cooper. Tell him the product to be packed, and take his recommendations. As you can see from the foregoing, the weight, method of shipment, length of shipment, etc. are important. Tell him the whole story; how far the product is to be shipped, how long it will be in storage, and all the details. This will aid the cooper in choosing the exact barrel to solve your particular problems.

OPENING AND CLOSING

Preparations

Inspect both ends of the empty barrel and if the chimes (the ends of the staves extending beyond the heads, see diagram) are the same thickness, take out the head with the least number of pieces.

If one chime is thick and the other chime is thin, take out the head in the end with the thin chime. A thick chime usually denotes the bottom of the barrel.

If the barrel is to carry extra heavy weight or is to be used for export, consult the export specifications (Page 23) or your barrel supplier.

Before Opening

After selecting the end of the empty barrel to be opened, turn it bottom side up and seal the bottom head. Fastening should be made by either of the following methods:

1. Drive nails through the hoop and staves horizontally into the head, spaced about six inches apart. Be sure that there is at least one nail at each end of each cant. Nails about the size of 3D common nails should be used.

2. For large users, a stapling machine is recommended (See Cooperage Tools, Page 83, or consult your cooper).

Test the bilge hoops (see diagram) for tightness. If at all loose, drive them tight with hammer and redrive and replace hoop fasteners.

Opening

1. Release the top head hoop by tapping gently upward with a hammer until about half the hoop is above the edge of the chime (Figure 7). This will loosen the staves so that a light blow on one side of the head will drop it to the bottom of the barrel (Figure 8). The head then should be removed and laid in a clean place (Figure 9). Now drive the hoop down again level with the chime.

2. If a hickory catch ring is available (See Figure 10, and Tools, Page 83), it can be driven down below the head hoop to take the place of the head hoop, which can be removed entirely.

Do not allow a barrel to stand for any length of time with head hoops removed. Also, a barrel with top head removed may collect dust and dirt.

Bag Liners

When using bag liners, see chart and instructions on liners (Pages 33 and 34).

Closing One-Piece Head

After barrel is filled and bag liner tied, replace the head (Figure 11), taking care that the liner is pressed down out of the croze so that the head will not pinch or puncture the liner. (See instructions and chart on liners, Pages 33 and 34).

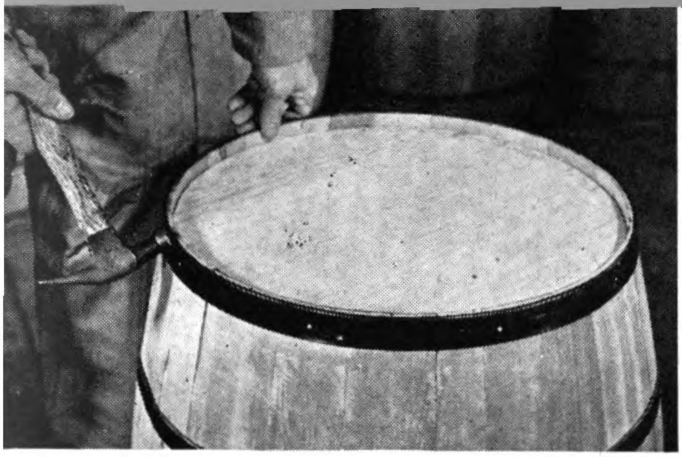


Fig. 7

Drive the head hoop upward about half its width, to release the staves. Place one edge of the head in croze and press or tap down lightly with a hammer until the head is seated in croze all around the barrel.

As the head slides into place, keep tapping top hoop with hammer gently around the barrel. Avoid driving hoop down tightly at any one place, but endeavor to bring it down evenly all around the circumference of the barrel.

When the head hoop is finally level with the end of the staves, the barrel is ready to have the hoops and head nailed or stapled.

Closing Multiple Head

If the head has several pieces, insert the middle cant (or piece) first, tapping the hoop down lightly. Then insert the larger side cant, saving the narrower side cant for the last.

If a side cant fills about one-half the barrel (Figure 12), insert it first; then middle cant, and the smaller side cant last. If there are only two pieces in a head, insert the wider cant first, and the narrower cant last.

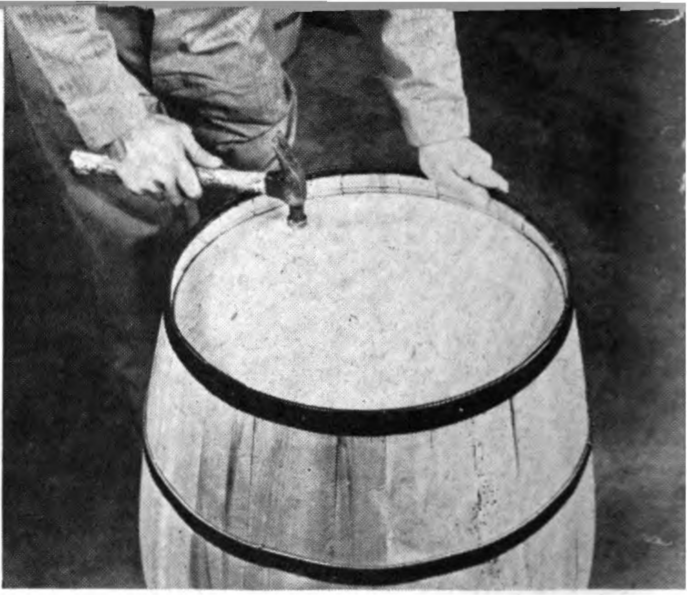


Fig. 8

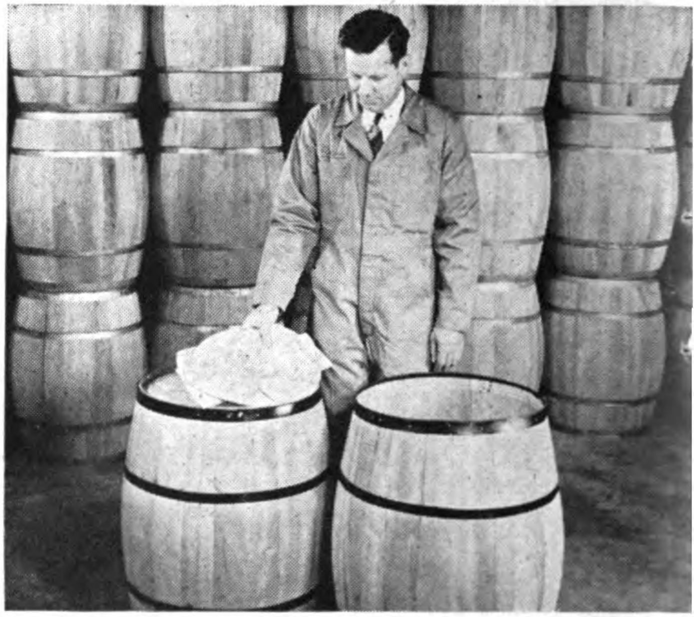


Fig. 9

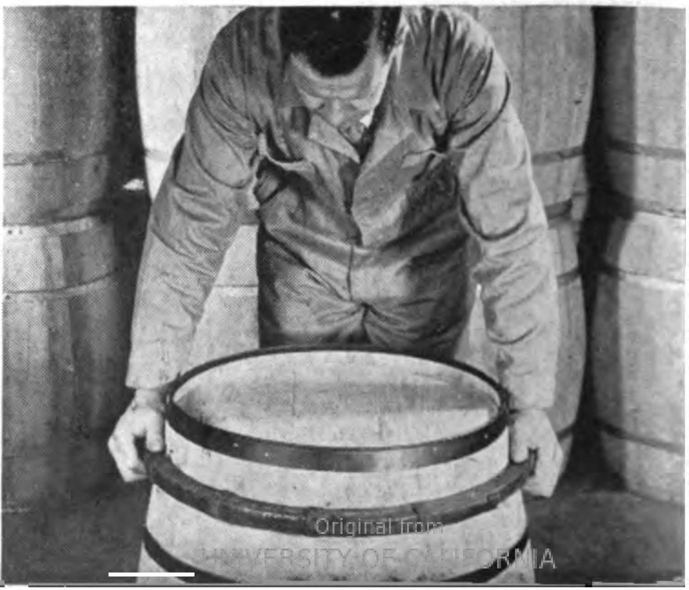


Fig. 10

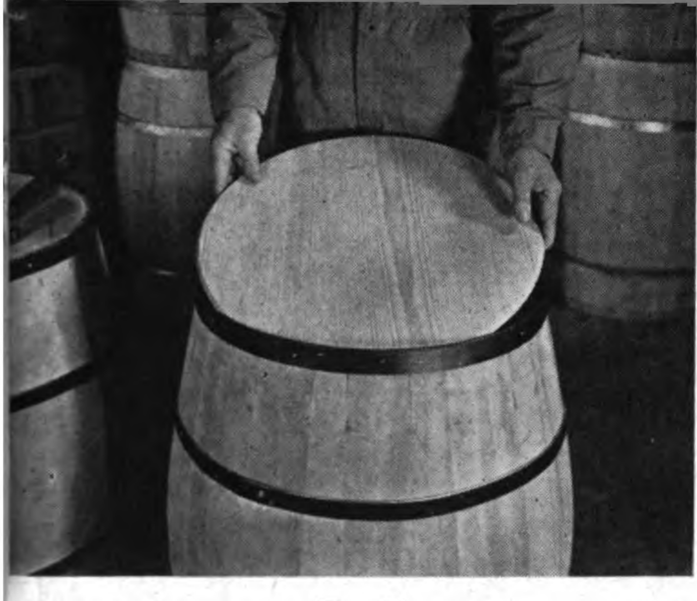


Fig. 11

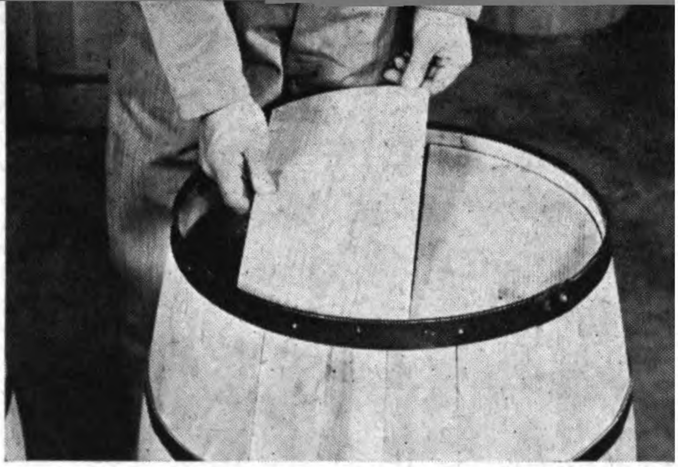


Fig. 12

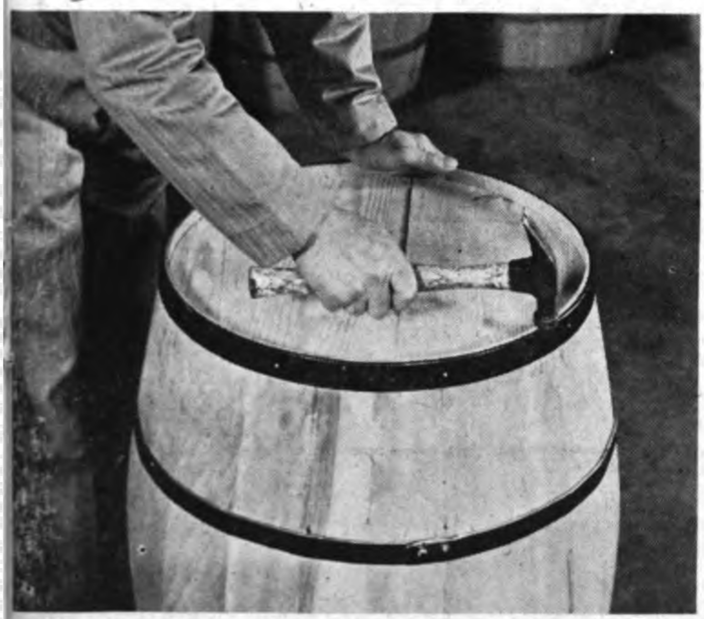
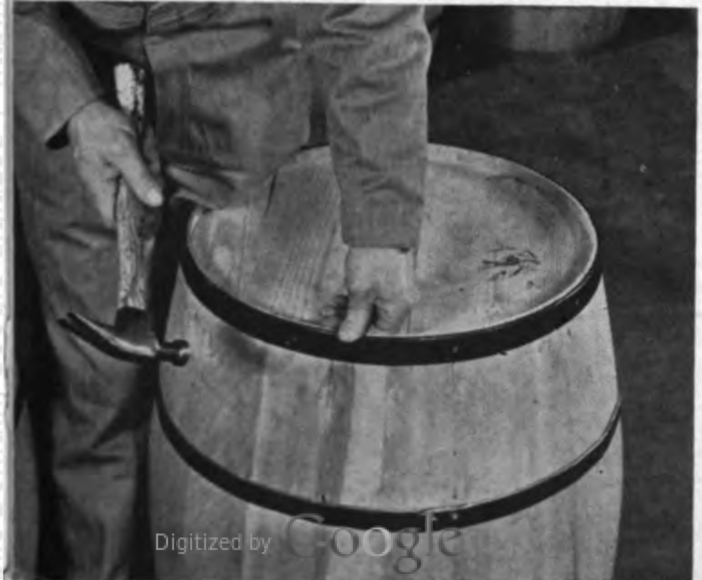


Fig. 13



While the cants are being placed, keep tapping the head hoop down all around the barrel (Figure 13) until the head is snugly in place and the bead (or edge) of the hoop is level with the top of the chime. The barrel is now ready for nailing or stapling, as explained under paragraph "Before Opening." (See Figure 14 and Tools, Page 83).

Don'ts

Don't knock a head in with an axe or a hammer. You are damaging a valuable container.

Don't hammer and pound the hoops as hard as you can. Tap lightly and keep going around the barrel.

Don't try to insert bag liners without reading the chapter on liners (Page 34).

Don't try to open and close barrels without the proper tools. An investment of a few dollars in tools may save you many dollars in labor and resale value of the containers. (See chapter on Tools, Page 83).

Don't hesitate to consult your cooper. He will be glad to advise you and to show you the proper methods of opening and closing.

Fig. 14

Handling by Hand

The slack wooden barrel, because of its "double-arch" construction, is one of the strongest containers ever developed. If well made and properly handled, it will give you the utmost in service. Most of the troubles experienced with slack barrels can be traced to the inexperience and carelessness of those who handle them.

A slack barrel, although strong and resilient, is not indestructible. Treat it right and it will treat you right.

The barrel has rightfully been called "the container on wheels." Because of its shape, it can be handled by one man, even though loaded with several hundred pounds. Due to its bilge, a barrel rests on a small surface when on its side, reducing friction to a minimum. On its side, the barrel responds readily to a push in any direction. Rolled, it covers distances quickly and with a minimum of effort. On an incline, it moves of its own weight. It is easily turned and guided in any direction, as it pivots on a small contact point.

Rolling

Never roll a barrel on its edge (the chime, see chart). This may cause damage to the portion of the staves that extends beyond the head. A barrel is designed to be rolled on its bilge, or side.

Never let a loaded barrel drop, even for a few inches. When unloading from a car or truck, use a skid. (Figure 15.) Do not permit barrels to roll or slide freely down a skid. "Ease" them down, and "ease" them to a stop. If a barrel is permitted to smash into another barrel at the bottom of the skid, damage may result. Do not roll barrels over obstructions or rough surfaces, such as cobblestones or tracks.

Upending

The upending of a loaded barrel is a simple process. Grasp the barrel firmly by the chime (the ends of the staves which extend beyond the head to form a natural handle). Then rock it gently back and forth until it rocks into an upright position.

Lifting

A barrel can be lifted without danger to the lifter if he follows a few simple rules. First, stand close to the barrel, feet close together, knees bent. Grasp the barrel firmly. Let the leg muscles do most of the work in the early stages of lifting, until the back and arm muscles assume the load. With this method, there is little strain on the abdomen and small danger of a rupture. (Figure 16.)

Loading on Ships

When loading barrels on shipboard, chime hooks (Figure 17) or slings (Figure 18) should be used. With a sling, approved practice calls for two barrels to the sling with an additional half-turn around one of the barrels to prevent slipping. Never use a loading net for handling barrels at shipside.

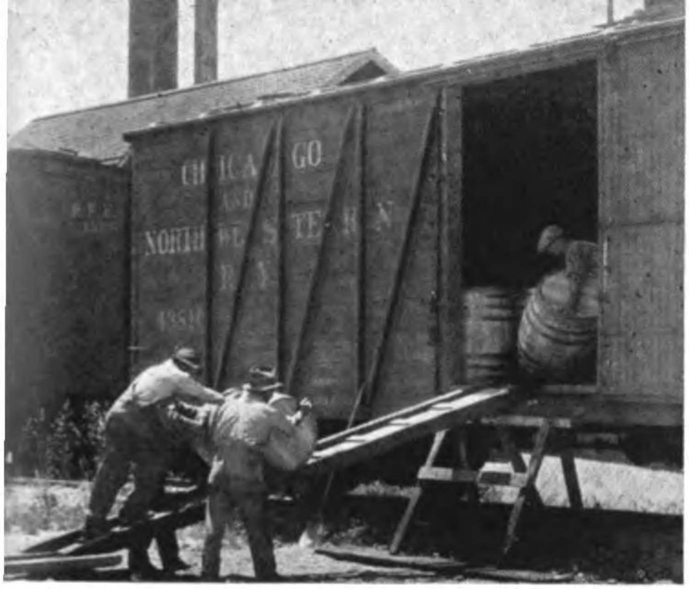


Fig. 15

Fig. 16

Mechanical Handling

There are a number of mechanical devices on the market for handling and lifting barrels. These are used by large purchasers of barrels, where speed and efficiency are demanded. The same features that allow the barrel to be moved easily by hand also make it adaptable to speedy handling by machinery.

Inclined tracks, down which the barrel will roll of its own weight, are used in many industries. They can be built of either wood or metal, and the incline should be slight so that the barrel will not move too fast.

Power conveyors also can be purchased which will meet all handling problems. These conveyors will handle barrels in inclined or horizontal runs, will carry them up or down inclines, and will make right angle turns. Conveyors also are made which will raise and lower barrels, and load and discharge them with automatic kick-offs. "Kangaroo" or "grasshopper" conveyors eliminate manual handling for short lifts without breaking the conveying line. In short, modern conveyors will handle almost any conveying problem (Figure 19).

A variety of machinery is made to handle the lifting and racking of barrels. Hand and power operated lifters and elevators, as well as portable cranes, are used in many plants. Lifters come in standard capacities of 350, 500, 750, 1,000 and up to 5,000 pounds, and are furnished for any reasonable height. Power-operated machines are preferable when the lift is higher than 16 feet (Figure 20), or where large numbers of barrels must be handled. Cranes, with the ability to reach over piles of material and pick up barrels in the back row, are made with lifting capacities of from 500 to 5,000 pounds. They can be obtained for any reasonable lifting height, with fixed or revolving boom, hand or electrically operated.

Barrel trucks, hand or power operated, are made to handle loads up to 800 pounds. (Figure 21.) One hand truck has an adjustable bail which can be moved to five different positions to accommodate various sizes of barrels. In loading or unloading, the trucker does not touch the barrel,

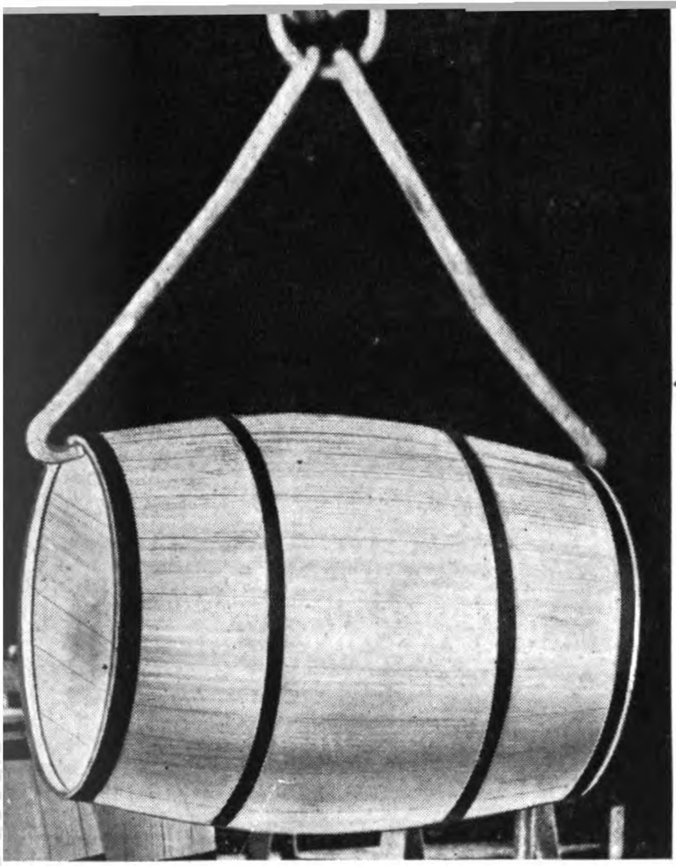


Fig. 17

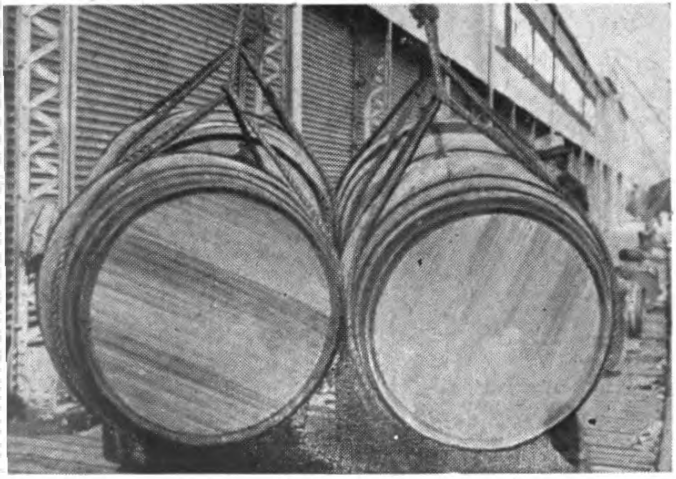


Fig. 18

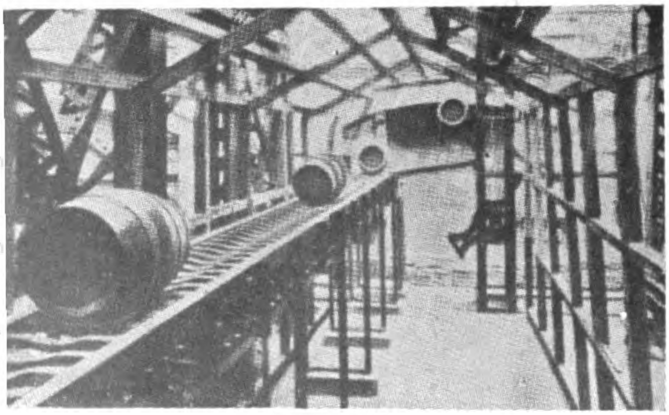


Fig. 19

but merely tilts the truck in an upright position to cause the bail to fall around the barrel; then tilts the barrel against the truck by a slight pull on the handles. Power industrial trucks are available in many sizes and models, and some are combination trucks and lifts (Figure 22).

If you are a large user of barrels, and have handling problems, consult the various conveyor manufacturers. They can solve them for you.

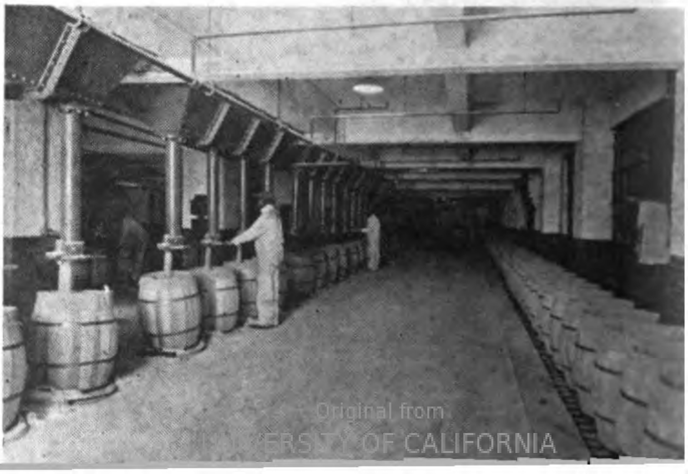
Filling and Emptying

Various machines and devices are available for the filling and emptying of barrels. Often these machines are built to specifications for the user, and fit right into the production line. (Figure 23.)

In many firms, fillers at the end of the production line flow products directly into the barrel. Agitators, which often are platforms designed to jolt and jar the barrel, shake the contents down so that the maximum amount may be packed.

Emptying machinery includes elevators and cranes, with tilting devices, which empty the barrels into bins or into receptacles on the production line.

Fig. 23



Conveyor manufacturers can supply standard equipment, or design equipment to fill your individual needs.

Storing Barrels

Ordinary care in the storing of slack barrels will cut your packaging losses. Never store slack barrels on their bilge, whether empty or filled. Store them on end. (Figure 24.) Never store barrels in a cellar or wet place, where they can absorb moisture. Store them in a dry place, but don't overlook the fact that an overheated warehouse will dry out the staves and cause shrinkage. Do not tier them more than two or three tiers in height, depending on the weight of contents and length of storage.

A properly dried barrel will not shrink enough in a few weeks or even months of storage to cause sifting, even without a paper liner. Some products, however, will absorb what little moisture there is in a well-dried stave, and slight shrinkage may result. Therefore, if filled barrels are stored for a considerable length of time, it is well to check the bilge hoops (See diagram) occasionally to see if they are tight. The bilge hoops should be redriven when necessary and fastened just before shipment is made.

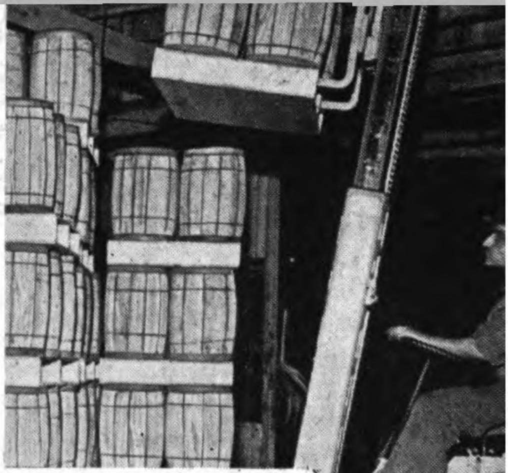


Fig. 22

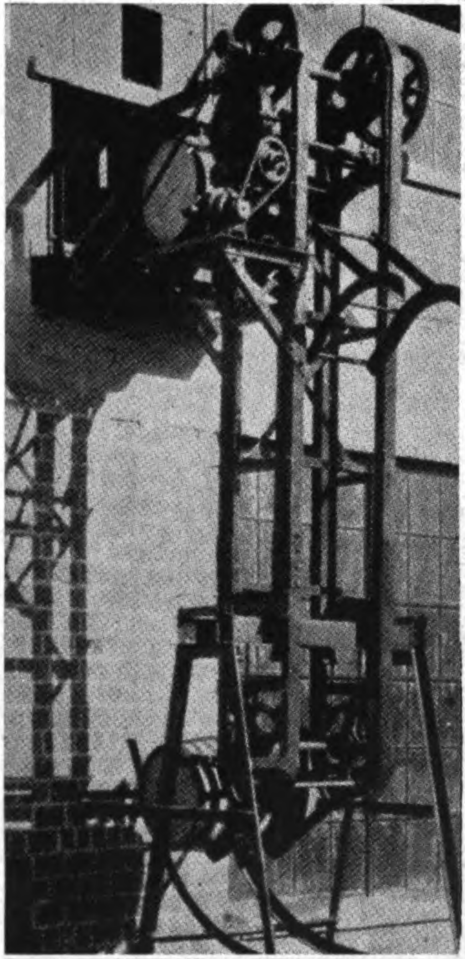
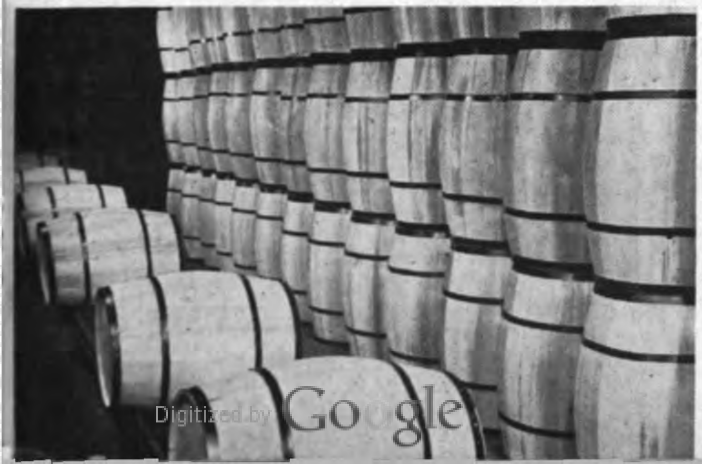


Fig. 20

Fig. 24



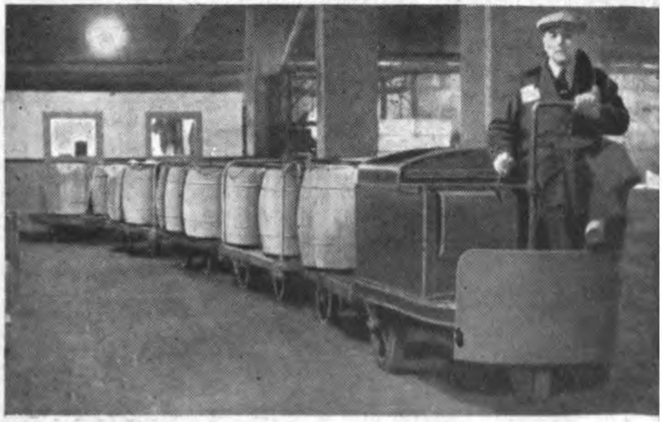


Fig. 21

INTERSTATE COMMERCE COMMISSION REGULATIONS

Shipping Container Specifications 11-A (Revised effective January 7, 1941) Wooden Barrels and Kegs, Slack

General

1. Compliance—required in all details.

2. Classification of woods—as follows:

Group A: Oak, beech, maple, elm, red gum, sycamore, hackberry, birch, Douglas fir, white ash.

Group B: Cottonwood, basswood, tupelo gum, pine, chestnut, willow.

Material

3. (a) Staves—Of Group A woods, No. 1 grade, kiln-dried; of uniform thickness, well equalized, circled, and jointed; minimum thickness 5 staves to 1⅞"; maximum width 5½".

(b) To be tongued and grooved.

4. Heading—To be No. 1 grade, kiln dried, uniform thickness, turned true to size, dressed on one side, and jointed and glued.

5. Metal hoops—Of cooperage-grade hoop steel with one edge beaded or rolled.

6. Wooden hoops—No. 1 grade coiled elm at least 9/32"x5/32"x1⅜"; ends joined by 1 staple and 2 additional nails or staples clinched on the inside.

7. Parts and dimensions (See Page 19).

8. Head liners—Required as provided in Paragraph 13.

Marking

9. On each container—To be applied by the maker on top head as follows:

(a) ICC—***; stars to be replaced by specification number under which container was made, followed by the authorized gross weight (authorized net weight plus tare weight; for example, ICC—11A475, ICC—11B370, etc.). This mark shall be understood to certify that the container complies with all specification requirements.

(b) Name or symbol (letters) of maker; this must be registered with the Bureau of Explosives and located just above, below, or following the mark specified in (a).

10. Size of marking (minimum)—¾" high for head diameter over 17"; ½" high for others.

Closing

11. Heads—To fit well in croze and be secured by nails or staples at 8" spacing through hoops into heads.

12. Head battens (when required by Paragraph 7)—To be fastened at each end by ½" metal strapping nailed over chime and under hoops.

INTERSTATE COMMERCE COMMISSION SPECIFICATIONS

11-A

HEADING					STAVES	METAL HOOPS****	
Authorized Net Weight (Pounds)	Diameter Not Over*** (Inches)	Thickness at least		Number of Pieces Not Over	Length Not Over*** (Inches)	Width (Inch by Birmingham Wire Gage) (minimum)	
		Wood Group					
		A (Inch)	B (Inch)			HEAD	QUARTER** and BILGE
350	16	½	½	3	28	1⅝x23	1⅜x23
450	16	½	⅝	3	28	1⅝x23	1⅜x23
600	16	⅝	⅝	3	28	1⅝x23	1⅜x23
350	17	½	½	4	30	1⅝x23	1⅜x23
450	17	½	⅝	4	30	1⅝x23	1⅜x23
600	17	⅝	⅝	4	30	1⅝x23	1⅜x23
350	19	½	½	5	34	1⅝x22	1⅜x23
450	19	½	⅝	5	34	1⅝x22	1⅜x23
600	19	⅝	⅝	5	34	1⅝x22	1⅜x23
350	21	½	½	5	34	1⅝x21 or 2x22	1⅜x23 1⅜x23
450	21*	½	⅝	5	34	1⅝x21 or 2x22	1⅜x23 1⅜x23
600	21*	⅝	⅝	5	34	1⅝x21 or 2x22	1⅜x23 1⅜x23

*Head battens required; at least ½"x3½"; ends rounded to fit chime; securely nailed to heads.

**Quarter hoops not required for 350 pounds authorized net weight.

***Tolerance of ⅛" authorized.

****Wooden hoops authorized: 8 for 350 pounds net; 10 for 450 pounds net; 12 for 600 pounds net.

13. Head liners—To extend across grain, circle at least ½ of circumference, and be nailed or stapled at 5" intervals. Required for containers with wooden hoops when net weight of contents is to exceed 250 pounds.

14. Quarter and bilge hoops — To be redriven and fastened by 4 fasteners for each hoop; puncture fastening at 8" intervals authorized for metal hoops.

Specification 11-B
Wooden Barrels and Kegs, Slack

Containers must comply with specification 11-A except as follows (paragraph references are to Specification 11-A):

3. (a) Staves—Of Group A woods, No. 1 grade, kiln dried; of uniform thickness, well equalized, circled, and jointed; minimum thickness 5 staves to 1⅞"; maximum width 5½". Group B woods authorized for 24" or shorter staves.

3. (b) This paragraph does not apply.

4. Heading—To be No. 1 grade, kiln dried, uniform thickness, turned true to size, dressed on one side, and jointed.

GRADE RULES

Grade Rules and Specifications Adopted by the Slack Cooperage Group of the Associated Cooperage Industries of America, Inc.

Slack Barrel Staves

1. Elm and gum staves 28½ inches and longer shall measure 5 staves to 1⅞ inches in thickness.

2. Cottonwood and basswood staves 28½ inches and longer shall measure 5 staves to 1-15/16 inches in thickness.

3. Elm, gum, cottonwood and basswood staves 24 inches and shorter shall measure 6 staves to 2 inches in thickness.

4. Hardwood staves, oak, beech and maple, 28½ inches and longer shall measure 6 staves to 2⅛ inches in thickness.

5. Hardwood staves, oak, beech and maple, 24 inches and shorter, shall measure 6 staves to 2 inches in thickness.

6. White ash staves shall measure 5 staves to 2⅛ inches in thickness.

7. No. 1 staves, except ash, shall be of uniform thickness, well equalized, circled and jointed, free from knots, slanting shakes, worm holes or dozy wood, except that moderate stain, slight roughness, flat staves less than 4" in width across the bilge, cross grained which will not break or splinter in trussing or slight warpage shall not be considered defects.

8. Meal barrel staves shall be free of slanting shakes over 1½ inches long, knot holes and unsound knots (but sound knots not over ¾ inch in diameter shall be allowed), and shall consist of good, sound, workable staves. Moderate stain, mildew or discoloration, no defect.

9. Mill run staves shall consist of the run of the knife, well equalized, made from regular run of stave logs and shall contain 40% or more of No. 1 staves. ALL dead culls out.

10. No. 2 staves shall, unless otherwise specified, contain the meal barrel grade and be free from dead culls. Mildew and stain no defect.

Stave Dimensions

11. Standard bilge on staves, unless otherwise specified, shall be as follows: 18 inches to 22 inches in length, both inclusive, ½ inch bilge; 23 inches to 28½ inches in length, both inclusive, ⅝ inch bilge; 30 inches in length, ¾ inch bilge; 32 inches and 34 inches in length, ⅝ inch bilge.

12. Standard quarter shall be as follows: On staves 18″ to 22″ in length—4½″ to 5″ both inclusive; staves 23″ or 24″—6″ or 6½″; on staves 27″ to 29″ both inclusive—8″; 30″—8½″; 32″ and 34″—9″.

13. No. 1 staves longer than 24 inches shall not be less than 2 inches nor exceed 5½ inches in width measuring across the bilge. No. 2 staves of same lengths may be from 2 inches to 6 inches in width.

14. All barrel staves 28½ inches and longer to average in measurement, after being jointed, 4 inches per stave or 4,000 inches per thousand staves.

15. Half barrel staves, 24 inches, to average in measurement, after being jointed, 3½ inches to the stave, or 175 inches to the bundle of 50 staves.

16. Keg staves to measure 160″ to the bundle of 50 staves.

16a. Shortage of measurement is subject to adjustment between buyer and seller, but not subject to rejection.

17. All staves shall be thoroughly dry before jointing and shall be measured across the center of the bilge.

Ash Staves

18. No. 1 white ash staves shall be of uniform thickness, smoothly cut, free of knots, slanting shakes, dozy timber, worm holes, stains or mould of any kind which make the stave unfit for use in the manufacture of No. 1 butter tubs and to average not less than 75 per cent white.

19. No. 2 ash staves—same specifications as No. 2 gum and elm. (Except as to bilge. See Rule No. 20.)

20. All ash staves shall be jointed with ⅝ inch bilge unless otherwise specified.

⁂

21. Mill run apple barrel staves, unless otherwise specified, shall be cut 6 staves to 2 inches in thickness and shall consist of the run of the mill from the regular run of stave logs. An average of not less than 60% of the staves to be bright on the outside. At least 40% of all staves to be No. 1 with respect to manufacture and

timber. All mill run apple barrel staves, unless otherwise specified, shall be jointed with 19/32" bilge.

22. Staves not specifically mentioned should be sold according to the local custom or by special agreement. Same will apply as well to bilge of such staves.

23. Dead cull staves are staves containing knot holes of over ½" in diameter; staves with large coarse knots near the quarter or within 1" of either end preventing staves from being trussed in barrels or properly crozed; staves cross grained near the quarter to such an extent as will result in stave breaking when being trussed in barrel; staves under ¼" in thickness; staves with bad slanting shakes exceeding 6 inches in length or with rot that seriously impairs strength.

23a. The term Gum Mixed Timber Staves shall be understood to include Sycamore, Elm, Hackberry, Maple, Sweet Gum, Red Gum and Birch, but not to include Cypress, Oak, Ash, Tupelo Gum, Cottonwood, Pine, Black Gum, Beech or Box Elder.

Coiled Elm Hoops

24. Standard dimensions of coiled elm hoops, 5 feet 6 inches, and longer, to be, when finished and seasoned, 9/32 inch x 5/32 inch x 1⅜ inch.

25. Dimensions of keg hoops, 5 feet and shorter, may be 4/16 inch x 2/16 inch by 1¼ inches, or standard dimensions as provided in Section 24.

26. No. 1 hoops shall be of good sound timber, up to specifications, well finished, and free from broken and other defective hoops in the coil in excess of 3% on hoops over 5 feet in length, 5% on 5-foot hoops and 8% on hoops less than 5 feet long, which are unfit for use on a barrel, and to be dry when shipped.

Slack Barrel Heading

27. No. 1 basswood, cottonwood, willow, and poplar heading shall be manufactured from good, sound timber, thoroughly kiln-dried, turned true to size, and shall be ½ inch in thickness after being dressed on one side, and free from all defects making it unfit for use in No. 1 barrels. Stain or discoloration on under side no defect. To be jointed straight unless otherwise specified.

28. No. 1 hardwood and gum mixed timber heading shall be of the same specifications as in Paragraph 27 excepting that the thickness after being dressed shall be 7/16". The following timbers are permissible in gum mixed timber heading: Gum, Sycamore, Elm, Hackberry, Maple, Sweet Gum, Red Gum and Birch.

28a. Tupelo Gum heading shall be the same specifications as paragraph 27. In tupelo gum heading, black gum and box elder are permissible.

29. Mill run heading shall consist of the run of the saw from the regular run of heading bolts or logs, without any previous culling to select out the better grade, well manufactured of standard thickness and kiln-dried. All dead culls out and to contain not less than 50% No. 1 pieces or cants.

30. Pine heading, all sizes, shall be ½ inch in thickness after being planed

on one side. Specifications otherwise to be the same as provided in Paragraphs 27 to 37, both inclusive, except thickness shown in Paragraph 28.

31. No. 2 heading shall be manufactured from heading blanks culled in the process of manufacturing No. 1 heading and shall be workable and free from dead culls.

32. All heading to be well bundled, 15 sets to the bundle, sizes 14⅛ inches to 19¾ inches, inclusive; 2 wires to the bundle, sizes under 19⅛ inches; 3 wires to the bundle, sizes 19⅛ inches and over. (See Par. 37 for specifications covering bundling of Pine Heading.) Number of pieces to the head not to exceed the following:

33. No. 1 and M. R. grades, above 13½ inches and to 17⅛ inches, inclusive, 3 and 4 pieces, at least 50% to be 3 piece, or less.

34. No. 1 and M. R. grades, 18 to 19½ inches, inclusive, 3, 4 and 5 piece, at least 50% to be 4 piece, or less.

35. Heading that contains knot holes of over ½ inch diameter, bad slanting shakes, rotten timber or other defects that make it unworkable, shall be considered as dead culls.

36. All stock not specifically mentioned, staves, hoops or heading, should be bought and sold on specifications agreed upon between the buyer and seller.

36a. All heading including pine heading to be turned with a 90% bevel and ¼" wide on the face side of head unless otherwise specified.

37. Pine Heading, up to and including 12½", 25 sets to bundle, 2 wires.

Pine Heading, over 12½", to but not including 17⅛", 20 sets to bundle, 3 wires.

Pine Heading, 17⅛" and over, including 20", 15 sets to bundle, 3 wires.

Pine Heading, over 20", 12 sets to bundle, 3 wires.

EXPORT SPECIFICATIONS

General

The following specifications are recommended by The Associated Cooperage Industries of America, Inc., for slack barrels to be used in export shipment:

(a) Slack barrels are used in shipping articles covering a wide range of weights and physical characteristics. They are especially useful for the shipment of dry powderous articles or solids shipped in bulk lots.

(b) Barrels should be loaded to full capacity to insure a minimum shifting of the contents in transit. In the case of heavy concentrated loads, suitable filler material shall be used to assure complete filling of the barrel.

(c) The construction of slack barrels in this General Specification is not intended to provide for weight of contents in excess of 1,000 pounds.

(d) Slack barrels may be provided with a separate liner to protect the contents from contamination, abrasion or to facilitate removal of contents.

(e) Each barrel shall be marked with the barrel manufacturer's name and address and the maximum weight of contents that may be packed in the barrel as specified in this specification.

Application

(a) These specifications apply to slack barrels for overseas shipment of materials and supplies. The same design of barrels may be used for domestic shipment.

(b) Slack barrels shall not be used for the transportation of liquids.

Definitions

(a) SLACK BARREL — A slack barrel is a round, bulging, coopered wooden container made of staves and heads held together in position by means of hoops. The head is generally removable for the reception of the contents.

(b) STAVE—A stave is an arched vertical component forming the walls or sides of a barrel.

(c) HEAD—A head is a circular formed member fitted into the croze of a barrel to form the ends (top and bottom).

(d) CANT — A cant is a board making up a segment of a head.

(e) CHIME — The chime is that portion of the staves extending beyond the outside surface of the heads.

(f) CROZE—The croze is a triangular shaped groove cut into the inside circumference of the barrel near the ends of the stave to accommodate the head.

(g) BILGE — Bilge is the largest circumference of a barrel located at a horizontal plane through its center.

(h) HOOPS — Hoops are annular rings of flat steel (with beaded edge) fastened to staves around the circumference of the barrel to hold the barrel together.

Styles

Slack barrels are designated as Commodity, No. 1, Mill Run and No. 2.

Commodity barrels shall be used for heavy concentrated loads. No. 1 Slack Barrels shall be used when a sift-proof and moisture-proof container is required.

Waterproof bag liners shall be used with a No. 1 barrel when protection from water or moisture is required.

Mill Run Slack Barrels may be used when a sift-proof, moisture-resistant container is NOT required. Weight of contents limited to not exceeding 450 pounds.

No. 2 Slack Barrels may be used for the shipment of bulky articles not requiring a moisture-proof container or complete enclosure. Weight of contents limited to not exceeding 450 pounds.

Commodity and No. 1 Barrels shall conform in quality and construction, except as specifically noted in these specifications, to the requirements of Specification 11A of "Interstate Commerce Commission Regulations for Transportation of Explosives and Other Dangerous Articles by Freight." (See Page 18.)

Materials

Any of the following species of wood may be used in the manufacture of staves, heading and cleats.

GROUP "A"—Oak, birch, beech, maple, elm, red gum, sycamore, hackberry, douglas fir, white ash.

GROUP "B" — Cottonwood, basswood, pine, willow, western hemlock, poplar.

MOISTURE CONTENT — All staves and heading shall be thoroughly kiln-dried to a uniform moisture content not exceeding 7% of oven-dry weight at the time of removal from kiln.

Grades

No. 1 STAVES (a)—No. 1 staves shall be of uniform thickness, well equalized, circled and jointed, free from knots, slanting shakes, worm holes or dozy wood, except that moderate stain, slight roughness, flat staves less than 4″ in width across the bilge, cross grained which will not break or splinter in trussing or slight warpage shall not be considered defects. All dead culls are out.

MILL RUN (b)—Mill Run staves shall consist of the run of the knife, well equalized, made from regular run of stave logs and shall contain 40% or more of No. 1 staves. All dead culls out.

No. 2 STAVES (c)—No. 2 staves shall be free of slanting shakes over 1½ inches long, knot holes and unsound knots (but sound knots not over ¾″ diameter shall be allowed), and shall consist of good, sound, workable staves, and be free from dead culls.

DEAD CULLS — Dead cull staves are staves containing knot holes of over ½″ in diameter; staves with large coarse knots near the quarter or within 1″ of either end preventing staves from being trussed in barrels or properly crozed; staves cross-grained near the quarter to such an extent as will result in stave breaking when being trussed in barrel; staves under ¼″ in thickness; staves with bad slanting shakes exceeding 6 inches in length or with rot that seriously impairs strength.

Heading

Heading shall contain no dead culls.

No. 1 HEADING—No. 1 heading shall be manufactured from good sound timber, free from knots, knot holes, decay, shakes, splits, or cross grain, turned true to size and dressed on one or two sides to uniform thickness.

MILL RUN HEADING shall contain at least 50% No. 1 pieces or cants. Balance shall be No. 2 or better.

No. 2 HEADING shall be free from knot holes, knots exceeding ¾″ in diameter, decay, shakes or splits exceeding 1½″ and cross grain diverging more than 1″ in 10 inches. Heading shall be turned true to size and surfaced at least one side.

Wood Cleats

Wood cleats shall be equal in quality to No. 2 heading.

Steel Cleats

Steel cleats shall not be used on the heads of barrels whose diameter is 16″ or larger.

Hoops

Hoops shall be of cooperage grade hoop steel with one edge beaded or rolled.

Glue

Glue used in heading shall be animal-clear ground, or casein.

Construction

(a) Staves of Commodity and No. 1 barrels shall be tongued and grooved.

(b) Heads of Commodity and No. 1 barrels shall be tongued and grooved and glued or butt joined and glued to form a one-piece head.

(c) Staves of Mill Run and No. 2 barrels may be tongued and grooved or butt joined.

(d) The minimum thickness of staves shall conform to thicknesses shown in Tables I, II and III. (Pages 28, 29 and 30.)

(e) The minimum width of staves shall be not less than 2″ nor more than 5⅜″ measured across the bilge and the average width of staves in each barrel shall be approximately 4″.

(f) The thickness of heading shall be not less than the thickness shown in Tables I, II, III. Pages 28, 29 and 30.)

(g) No cant shall be less than 2½″ wide. The number of pieces in each head shall not exceed the number shown in Tables I, II and III. (Pages 28, 29 and 30.)

(h) The heads of each barrel shall be reinforced with either a metal or wood cleat (or batten). The thickness of the wood cleat shall be not less than ½″ nor more than ⅝″. The width of wood cleats shall be not less than that shown in Tables I, II, and III. The ends of wood cleats shall be rounded and beveled to conform to the chime.

(i) Steel cleats shall be not less than 1¼″ wide nor 23 gage thick. The cleat shall be formed to fit the chimes and the ends shall extend over the chimes and under the head hoops.

(j) Cleats shall be fastened to the heads, across the grain, with nails staggered in two rows with not less than 2 nails in each cant or spacing between nails less than 3½″. Nails shall be driven through the cleat into the head and smoothly clinched at least ⅛″.

Head Liners

When weight of contents exceeds 600 pounds, cross cleats or head liners shall be provided. Curved elm head liners, two to each head, extending across the grain of the heads, ¼ the distance of the circumference, shall be approximately ½″ x 3/16″ and secured to the chime with not less than 4 staples or nails spaced not more than 5″ apart. Points shall not protrude. (See Head Liners, Page 35.)

After the barrel is raised and trussed it shall be set by heating so that when the head hoop is removed it may be replaced without the use of a draw hoop.

The croze should be uniformly cut, and shall not exceed 1/3 nor be less than ¼ the thickness of the stave. The croze shall conform to bevels of the heading.

Chime

The distance from the top of the head to the end of stave shall not be less than ½″ nor more than ⅝″.

Specifications of Barrels

Table I ....Page 28
Table II....................................Page 29
Table III..................................Page 30

Assembly and Closure

All hoops shall be driven tight and level. Bilge and quarter hoops shall be fastened to the staves at not less than 4 points or more than 15-inch intervals with either nails, hoop fastener nails, or staples, or may be secured at equal intervals by piercing the hoops with a triangular punch. If the points protrude into the barrel they shall be smoothly clinched.

Head hoops shall be secured by means of bright nails not less than 1″x 12 gage, with ¼″ heads, or standard hoop staples which pass through the hoop and staves into the head, spaced not more than 6″ apart.

Wood cleats shall be secured at their ends either by means of 9-penny sinker or cooler nails (2 to each end) driven diagonally through the cleat and head and below the head hoop returning over the hoop and clinched flat, or by means of metal strips not less than 1¼″ x 23 gage which extend under the head hoop. Each strip shall be secured to the cleat with two nails and two nails shall be driven through the head hoop, metal strip and stave into the head.

Metal cleats shall pass under the head hoops and be firmly turned back over the hoop.

Head liners shall be applied after setting the head. (See Page 35.)

Barrel liners shall be of sufficient size to cause no strain on the liner when the contents are packed. (See Page 34.)

TABLE I

CONSTRUCTION

COMMODITY — PARTS and DIMENSIONS

Net Weight of Contents (In Pounds)	HEADING			STAVES Group A		HOOPS HEAD	(Brainard, Beaded Barrel) QUARTER BILGE		CLEAT
	Diameter (In.)	Minimum Thickness Wood Group A & B (In.)	Number of Pieces	Length in Inch	Thick-ness in Inch	Width in inch and thickness gage	Width in inch and thickness gage	Width in inch and thickness gage	Thickness x Width (In.)
600-1000	16	½	Single pc. head	24	½ or	1⅝ x 21 2 x 22	1⅜ x 23	1⅜ x 23	½ x 4
600-1000	16	½	Single pc. head	28	½	1⅝ x 21 2 x 22	1⅜ x 23	1⅜ x 23	½ x 4
600-1000	16	½	Single pc. head	30	½	1⅝ x 21 2 x 22	1⅜ x 23	1⅜ x 23	½ x 4
600-1000	17⅛	½	Single pc. head	24	½	1⅝ x 21 2 x 22	1⅜ x 23	1⅜ x 23	½ x 4
600-1000	17⅛	½	Single pc. head	28	½	1⅝ x 21 2 x 22	1⅜ x 23	1⅜ x 23	½ x 4
600-1000	17⅛	½	Single pc. head	30	½	1⅝ x 21 2 x 22	1⅜ x 23	1⅜ x 23	½ x 4
600-1000	19⅛	⅝	Single pc. head	30	½	1⅝ x 21 2 x 22	1⅝ x 23	1⅝ x 23	½ x 4
600-1000	21	⅝	Single pc. head	30	½	1⅝ x 20 2 x 21	1⅝ x 23	1⅝ x 23	½ x 5
600-1000	21	⅝	Single pc. head	34	½	1⅝ x 20 2 x 21	1⅝ x 23	1⅝ x 23	½ x 5

NOTE: Head liners or cross cleats to be provided on all barrels having weight of contents exceeding 600 lbs.

TABLE II No. 1 Barrel CONSTRUCTION PARTS and DIMENSIONS

	HEADING			STAVES Group A		HOOPS (Brainard Beaded Barrel)			CLEAT
Net Weight of Contents (In Pounds)	Diameter (In.)	Minimum Thickness Wood Group A & B (In.)	Number of Pieces	Length in Inch	Thickness in Inch	HEAD Width in inch and thickness gage	BILGE Width in inch and thickness gage	QUARTER Width in inch and thickness gage	Thickness x Width (In.)
Up to 350	16	½	Single pc. head	24 28 30	⅜	1⅝x23	1⅜x23	…………	½x4
350-450	16	½	Single pc. head	24 28 30	⅜	1⅝x23	1⅜x23	1⅜x23	½x4
450-600	16	½	Single pc. head	24 28 30	⅜	1⅝x23	1⅜x23	1⅜x23	½x4
Up to 350	17⅛	½	Single pc. head	24 28 30	⅜	1⅝x23	1⅜x23	…………	½x4
350 to 450	17⅛	½	Single pc. head	24 28 30	⅜	1⅝x23	1⅜x23	1⅜x23	½x4
450 to 600	17⅛	½	Single pc. head	24 28 30	⅜	1⅝x23	1⅜x23	1⅜x23	½x5
Up to 350	19⅛	½	Single pc. head	30	⅜	1⅝x23	1⅜x23	…………	½x4
350 to 450	19⅛	½	Single pc. head	30	⅜	1⅝x23	1⅜x23	1⅜x23	½x4
450 to 600	19⅛	⅝	Single pc. head	30	⅜	1⅝x23	1⅜x23	1⅜x23	½x5
Up to 350	21	½	Single pc. head	30 34	⅜	1⅝x21 2x22	1⅜x23	…………	½x5
350 to 450	21	½	Single pc. head	30 34	⅜	1⅝x21 2x22	1⅜x23	1⅜x23	½x5
450 to 600	21	⅝	Single pc. head	30 34	⅜	1⅝x21 2x22	1⅜x23	1⅜x23	½x6

TABLE III

CONSTRUCTION

Mill Run and No. 2

PARTS and DIMENSIONS

Weight of Contents (In Pounds)	HEADING			STAVES Group A & B		HOOPS	(Brainard Beaded Barrel)		CLEAT
	Diameter (In.)	Minimum Thickness Wood Group A & B (In.)	Number of Pieces	Length in Inch	Thick-ness in Inch	HEAD Width in inch and thickness gage	BILGE Width in inch and thickness gage	QUARTER Width in inch and thickness gage	Thickness x Width (In.)
Up to 350	16	½	3	24 28 30	⅜	1⅝x23	1⅜x23	…………	½x4
350 to 450	16	½	3	24 28 30	⅜	1⅝x23	1⅜x23	1⅜x23	½x4
Up to 350	17⅛	½	4	24 28 30	⅜	1⅝x23	1⅜x23	…………	½x4
350 to 450	17⅛	½	4	24 28 30	⅜	1⅝x23	1⅜x23	1⅜x23	½x4
Up to 350	19⅛	½	5	30	⅜	1⅝x23	1⅜x23	…………	½x4
350 to 450	19⅛	½	5	30	⅜	1⅝x23	1⅜x23	1⅜x23	½x4
Up to 350	21	½	5	30 34	⅜	1⅝x21 2x22	1⅜x23	…………	½x5
350 to 450	21	½	5	30 34	⅜	1⅝x21 2x22	1⅜x23	1⅜x23	½x5

SPECIFICATIONS FOR SLACK BARRELS FOR DRIED-SKIM MILK FOR EXPORT

General

Barrels for dried skim milk shall be new No. 1 slack barrels capable of holding from 150 pounds to 250 pounds of dried skim milk, and shall conform with the following specifications:

Materials

1. Any of the following species of wood may be used in the manufacture of staves: fir, gum, elm, hackberry, cottonwood, poplar, maple or firm sycamore.

2. Any of the following species of wood may be used in the manufacture of heading and cleats: fir, gum, cottonwood, poplar or pine.

3. Moisture Content: When removed from the dry kiln all staves and heading shall be kiln-dried to a uniform moisture content of not in excess of 7%.

4. No. 1 Staves: No. 1 staves shall be of uniform thickness, well equalized, circled and jointed, free from knots, slanting shakes, worm holes or dozy wood. Moderate stain, slight roughness, flat staves less than 4 inches in width across the bilge, cross grain which will not break or splinter in trussing, or slight warpage shall not be considered defects.

5. No. 1 Heading: No. 1 heading shall be manufactured from good sound timber, free from knots, knot holes, shakes, splits, or cross grain turned true to size. It shall be surfaced on one or two sides to uniform thickness.

6. Wood Cleats: Wood cleats shall be free from knot holes, knots exceeding ¾ inch in diameter, and shall be manufactured from sound timber containing no defects which will impair the strength of the cleat.

7. Hoops: Hoops shall be of cooperage grade hoop steel with one edge beaded or rolled.

8. Glue: Glue used in heading shall be clear ground animal or casein.

Construction

1. Staves shall be tongued and grooved.

2. Heads shall be tongued and grooved and glued, or butt jointed and glued to form a single piece head. There shall be not more than five cants per head, and each cant shall be in excess of 2½ inches in width.

3. The width of staves shall be not less than 1½ inches nor more than 5⅜ inches measured across the bilge, and the average width of staves in each barrel shall be approximately 4 inches.

4. Both heads of each barrel shall be reinforced with a wood cleat (or batten). The ends of the wood cleats shall be rounded and beveled to conform to the chime.

5. The wood cleat shall be fastened to the head, across the grain, with not less than eight ⅞-inch by 14-gage cement-coated barbed nails staggered in two rows equally spaced.

The wood cleat shall be fastened to the staves by one of the following three methods:

(a) By driving two 9-penny sinker or cooler nails diagonally through the cleat, head and stave so that they will penetrate the stave below the head hoop. These nails shall be returned over the hoop and clinched flat;

(b) By driving two 1⅛ inches by 12-gage bright nails through the hoop and stave into the center of the thickness of each end of the cleat;

(c) By driving two 11-gage standard barrel heading staples through the hoop and stave into the center of the thickness of each end of the cleat.

6. The croze shall be uniformly cut, and shall be not less than ⅛ inch nor more than 5/32 inch in depth. The croze shall conform to bevel of the heading.

7. The distance from the top of the head to the end of the staves shall be not less than ½ inch nor more than ⅝ inch.

Assembly and Closure

All hoops shall be driven tight and level. Bilge hoops shall be fastened to the staves at not less than 4 points, equally spaced, with nails, hoop fastener nails, or staples. The bilge hoops may be secured by piercing the hoops with a triangular punch at not less than 4 equally spaced points. If any of the fastening devices protrude into the barrel, they shall be smoothly clinched.

Head hoops shall be secured by means of bright nails of not less than 1 inch by 12-gage with ¼ inch heads, or standard hoop staples, which pass through the hoop and staves into the head. These nails or staples shall be equally spaced around the chime, three on each side of the cleat.

Liners

For the purpose of these specifications:

1. Basis Weight Means: The weight of 500 sheets of 24 by 36 inch paper.

2. Percentage of Wax Saturation Means: The quantity of wax needed to equal in weight the specified percentage of the basis weight of the paper.

Either of the following moisture-proof liners will be acceptable:

1. An outer liner of not less than 45-pound basis weight crinkled kraft which is 60 per cent paraffin saturated, and an inner liner of not less than 25-pound basis weight crinkled kraft which is 15 per cent paraffin waxed.

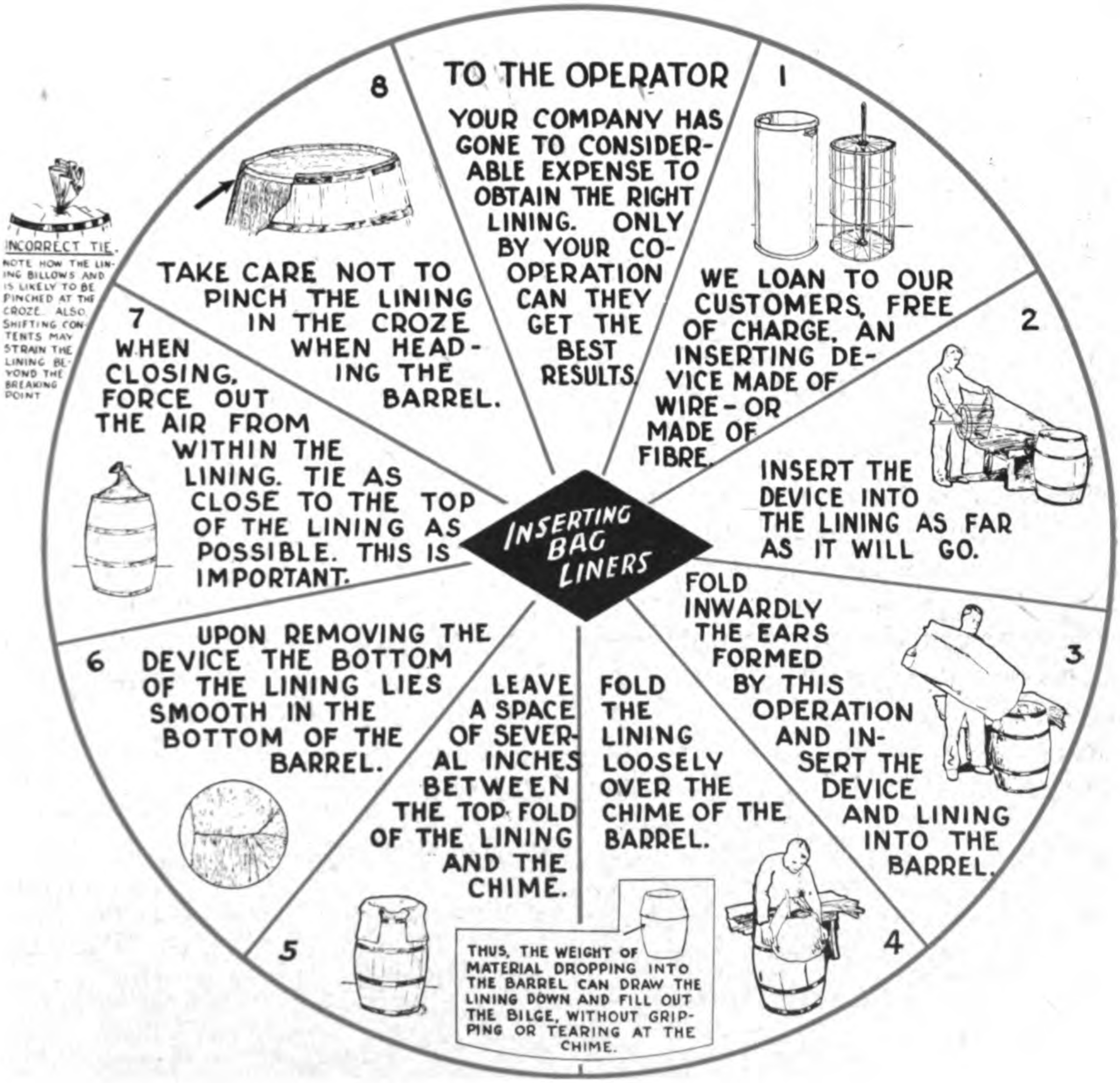
2. An outer liner of 90-pound crinkled duplex paper made of two sheets of 30-pound basis weight kraft laminated with an even layer of asphaltum, and an inner liner of not less than 25-pound basis weight kraft which is 15 per cent paraffin waxed.

The liners shall be tied separately as closely to the end as is practicable to close securely.

DRIED-SKIM MILK BARREL SPECIFICATIONS

HEADING			STAVES		HOOPS		CLEATS
Diameter Inches	Min. Thickness Inches	Number of Pieces	Length in Inches	Thickness in Inches	HEAD Width in Inches and Thickness Gage	BILGE Width in Inches and Thickness Gage	Thickness by Width (Inches)
17⅛	½	Single Piece Head	24	⅜	1⅝x22	1⅜x23	½x5
			28				
			30				
19⅛	½	"	30	⅜	1⅝x22	1⅜x23	½x5
21	½	"	30	⅜	1⅝x22	1⅜x23	½x5
			34		2x22		

CHART FOR INSERTING BAG LINERS



TO THE OPERATOR

YOUR COMPANY HAS GONE TO CONSIDERABLE EXPENSE TO OBTAIN THE RIGHT LINING. ONLY BY YOUR CO-OPERATION CAN THEY GET THE BEST RESULTS.

1 WE LOAN TO OUR CUSTOMERS, FREE OF CHARGE, AN INSERTING DEVICE MADE OF WIRE—OR MADE OF FIBRE.

2 INSERT THE DEVICE INTO THE LINING AS FAR AS IT WILL GO.

3 FOLD INWARDLY THE EARS FORMED BY THIS OPERATION AND INSERT THE DEVICE AND LINING INTO THE BARREL.

4 FOLD THE LINING LOOSELY OVER THE CHIME OF THE BARREL.

THUS, THE WEIGHT OF MATERIAL DROPPING INTO THE BARREL CAN DRAW THE LINING DOWN AND FILL OUT THE BILGE, WITHOUT GRIPPING OR TEARING AT THE CHIME.

5 LEAVE A SPACE OF SEVERAL INCHES BETWEEN THE TOP FOLD OF THE LINING AND THE CHIME.

6 UPON REMOVING THE DEVICE THE BOTTOM OF THE LINING LIES SMOOTH IN THE BOTTOM OF THE BARREL.

7 WHEN CLOSING, FORCE OUT THE AIR FROM WITHIN THE LINING. TIE AS CLOSE TO THE TOP OF THE LINING AS POSSIBLE. THIS IS IMPORTANT.

8 TAKE CARE NOT TO PINCH THE LINING IN THE CROZE WHEN HEADING THE BARREL.

INCORRECT TIE.

NOTE HOW THE LINING BILLOWS AND IS LIKELY TO BE PINCHED AT THE CROZE. ALSO, SHIFTING CONTENTS MAY STRAIN THE LINING BEYOND THE BREAKING POINT

Fig. 25

THE USE OF LINERS

The Bag Liner

A bag liner is a bag, made of various weights, sizes and combinations of materials, which goes inside of a slack barrel to hold the contents and protect it from moisture and sifting. Bag liners are used inside barrels for perishable products and products affected by moisture, such as powdered milk and dried eggs.

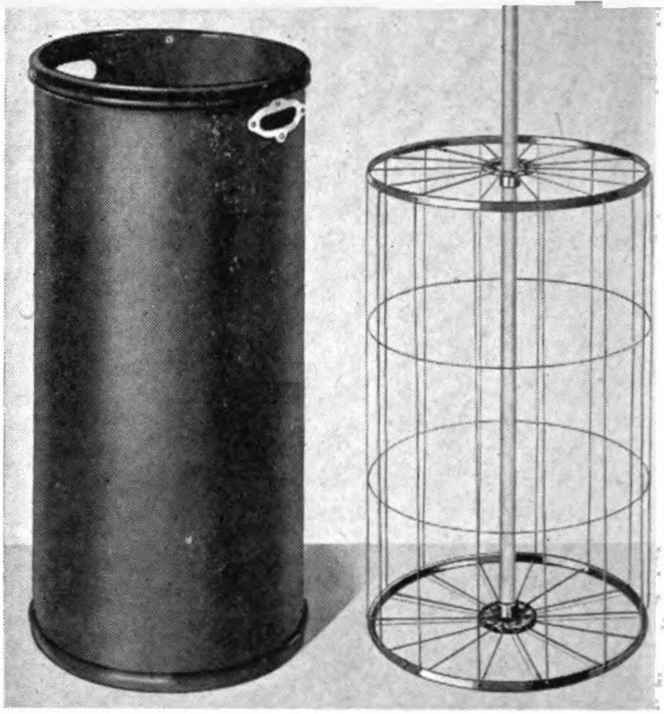


Fig. 26

Inserting Bag Liners

The careful application of a bag liner will save the barrel user many headaches. Bag liners improperly inserted may pinch and tear, thus causing loss and contamination of the product.

Several manufacturers of bag liners will loan to the barrel user, upon application, an inserting device which simplifies the operation greatly. These inserting devices are of two types—wire and fibre. (Figure 26.) The wire device is a round wire cage with a wooden handle extending through the center from bottom to top. The fibre device is actually a fibre drum with two slots for handles. Bag liner manufacturers also are able to furnish a third device for inserting one liner into another. In most cases, there is no charge for the loan of these inserters.

After you have received the inserting device, put it into the bag liner as far as it will go (No. 2 on Chart, Page 33). Then fold the ears of the bag liner inwardly (Figure 27) and insert the device and the bag liner into the upright barrel (No. 3 on Chart). Leaving the inserting device in the barrel, fold the ends of the liner that protrude loosely over the chime of the barrel (Figure 28 and No. 4 on Chart). Do not fold the liner down tight against the top hoop, but leave a space of several inches between the fold of the liner and the chime of the barrel (Figure 28 and No. 5 on Chart). The weight of the material used to fill the barrel will draw the liner down, and the space left between the fold and the chime of the barrel will prevent gripping or tearing of the liner when filling.

Now remove the inserter from the barrel (Figure 29), making sure that the liner lies smooth in the bottom of the barrel (Figure 30 and No. 6 on Chart). The barrel is now ready to fill. After filling, gather the liner together over the contents, and force out the air from within the liner. Tie the liner together as close to the top as possible. This is important. (Figure 31 and No. 7 on Chart.) When heading up the barrel, be sure the liner is clear from the head, so as not to pinch the liner in the croze (No. 8 on Chart).

Don'ts

Don't try to jerk, pull or force a liner. Work carefully and do it right.

Don't try to insert liners without an inserting device. It can be done, but it is a much more difficult job.

Don't pull the overlapping ends of the liner down even with the top hoop of the barrel. Leave a space so that the weight of the contents will draw the liner down into the barrel without tearing it at the fold.

Don't tie a bag liner down near the contents of the barrel, leaving a large "ear" sticking up. If you do this, the liner will billow and is liable to be pinched when you insert the head. Also, if tied close to the contents, the liner may be broken when the contents shift. Tie as close to the top of the "ear" as possible.

Don't use bag liners in your barrels without consulting your liner manufacturer. He will know the proper liner for your product, and will be glad to give you instructions on insertion.

The Head Liner

If the slack barrel is to carry an extremely heavy weight (in excess of 600 pounds), the use of head liners often is advocated. Head liners also are widely used where wooden hoops are employed.

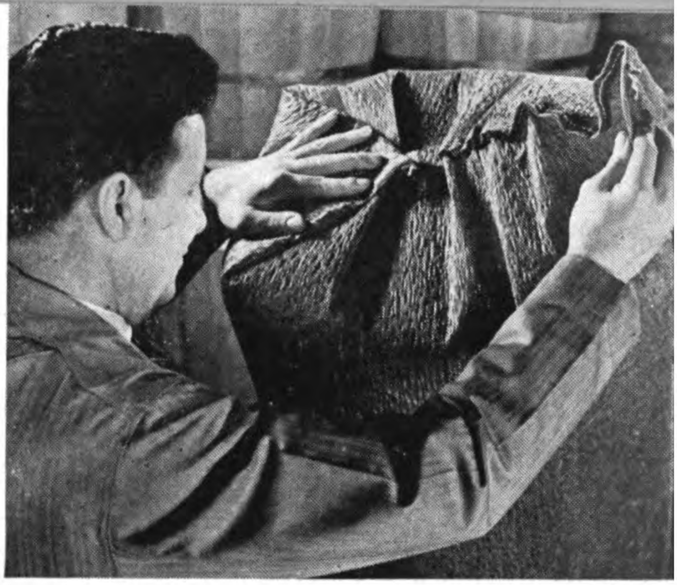


Fig. 27

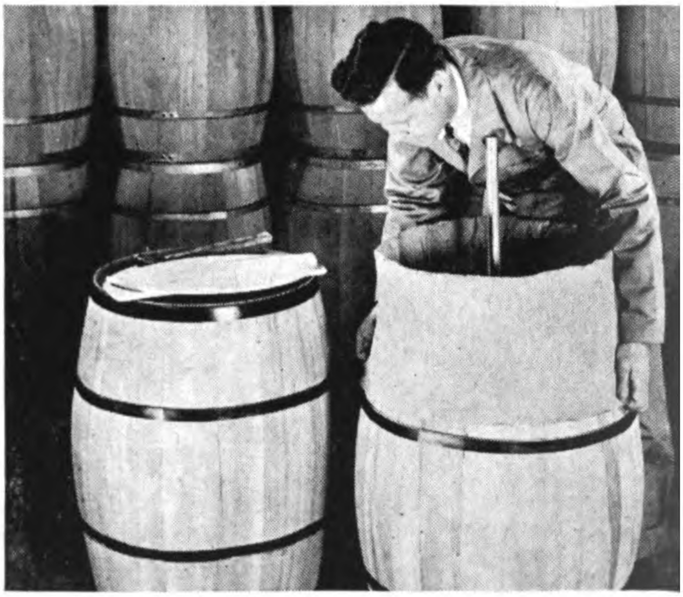


Fig. 28

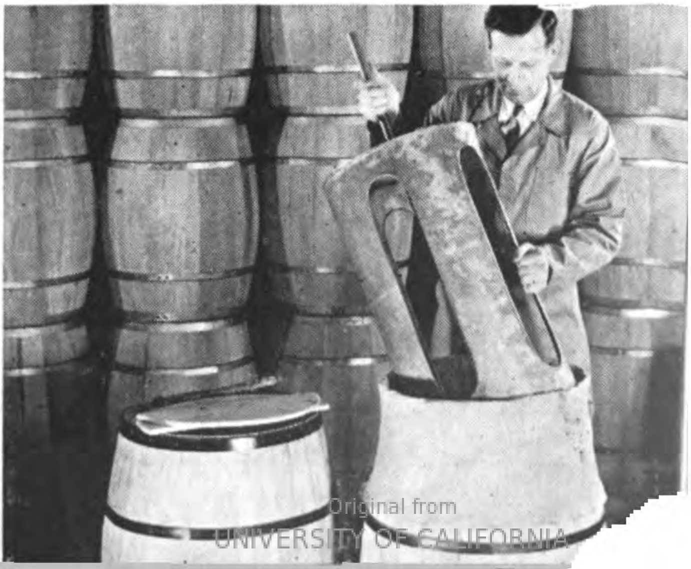


Fig. 29

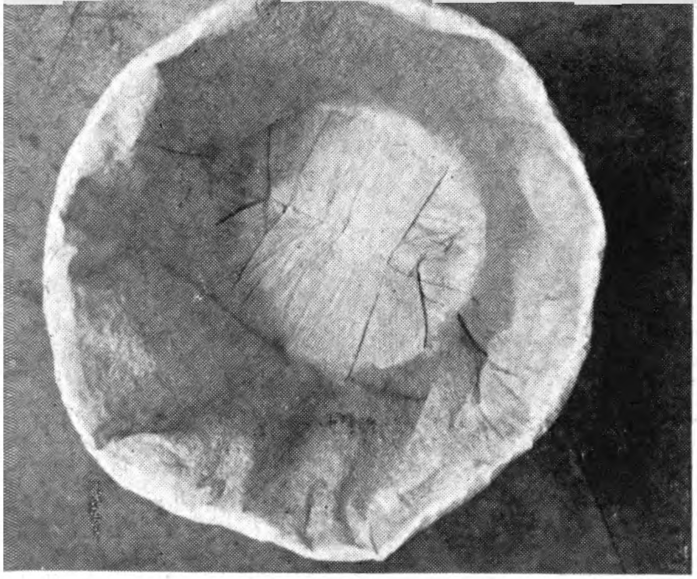


Fig. 30

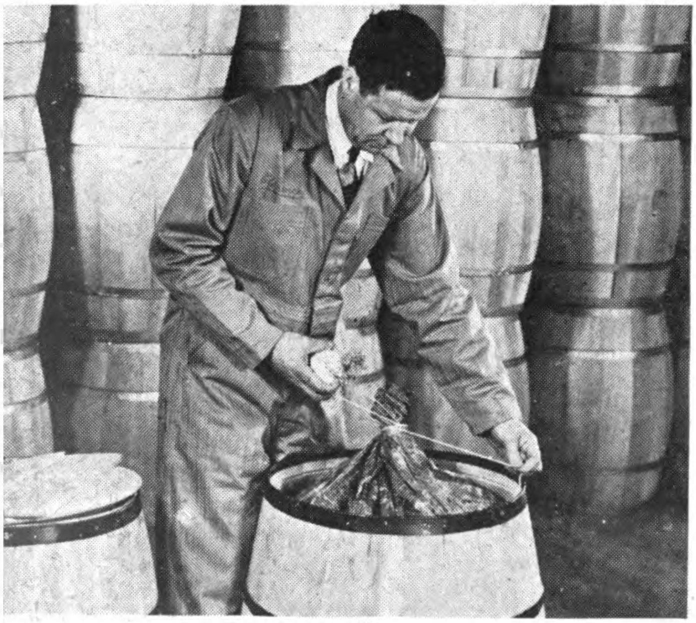


Fig. 31

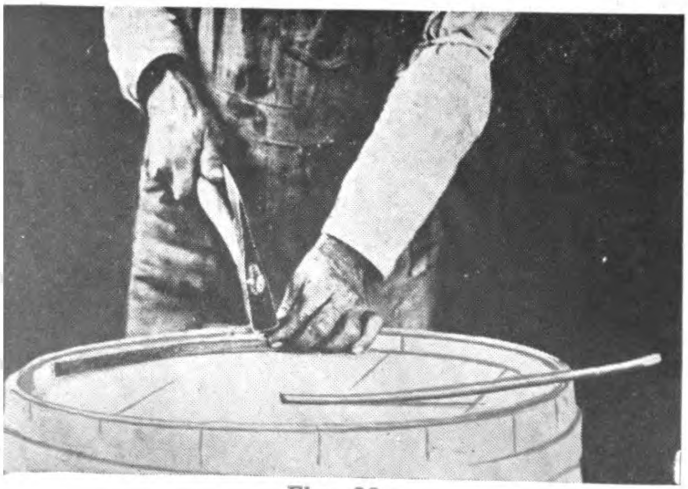


Fig. 32

Description

Head liners are strips of coiled elm wood, 12, 14 and 18 inches long, curved to fit the barrel. They are fastened around the inside of the chime, just above the heads, to keep the heads from slipping out of the croze, and to give the barrel and heads additional strength.

Application

Head liners usually come in bundles of 1,200. They should be soaked in water until they are pliable before using; otherwise, the nails may split them or they may break in bending.

They should be applied, two to each head, on the inside of the chime and running across the ends of the cants of the head (Figure 32). In ordinary cases, a head liner would cover one-fourth of the circumference. Where greater strength is needed, it is advisable to extend head liners around the entire circumference of the barrel. The head liners should be approximately ½″ by 3/16″ by 18″.

They should be secured by nails or staples not more than 4 or 5 inches apart. The points of the nails or staples should not be allowed to protrude.

When the use of head liners is required, consult your cooper as to where to obtain them and how to apply them.

THE *Tight* BARREL

SELECTING THE PROPER BARRELS

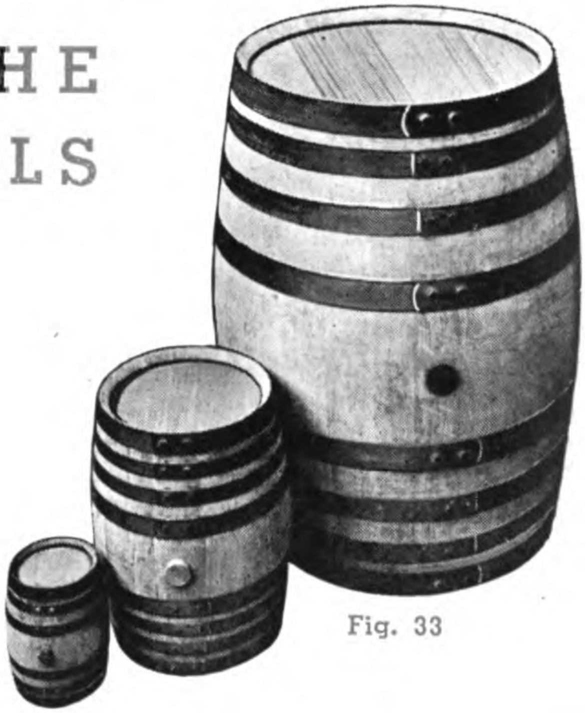


Fig. 33

General Rules

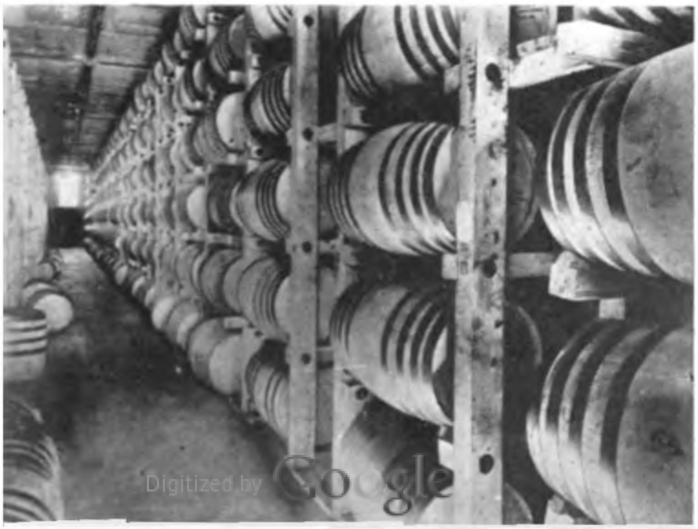
A tight barrel is what the name implies; liquid tight. It is usually employed for packing liquids, although it can be used for semi-solids and heavy solids.

Tight barrels are made from several woods, in many sizes (Figure 33), unlined or with a number of linings. Never order just a tight barrel. Always specify the product to be packed, where it will be shipped, how long it will be in storage, and all the details. In this way, the cooper can select the proper barrel for your product.

The importance of this cannot be overstated. Some liquids are difficult to hold, and a barrel of the wrong wood, an unlined barrel or a barrel with the wrong lining could prove unsatisfactory.

Take your cooper into your confidence. Ask him questions. Don't tell him what barrel you want; let *him* tell *you* what barrel to use.

Fig. 34



If you have a new product to be packed, or if there isn't a cooper in your vicinity, write to: The Associated Cooperage Industries of America, Inc., 408 Olive Street, St. Louis (2), Mo.

Standard Barrels

BOURBON BARREL: This barrel also is known as the whisky barrel. (Figure 34.) It is made of the highest grade white oak timber, quarter-sawed with the grain from straight-grained timber, free from sap (See Grade Rules and Specifications, Page 57). It is usually made with 6 hoops, although it can be supplied with 8 hoops on demand. It is used largely for whisky, and is charred on the inside for ageing bourbon whisky.

WHITE OAK BARREL, SAP CLEAR: This barrel is made of white oak timber, quarter-sawed with the grain from straight-grained timber, free from sap (See Grade Rules and Specifications, Page 57). It is not charred on the inside, and is usually used without a lining. It is used for acids, alcoholic liquids, liquid chemicals, extracts, fruit juices, vinegar, wine, white oil and similar products.

WHITE OAK BARREL, TIGHT SAP: This barrel is made from narrow, tight-grained white oak timber, quarter-sawed with the grain from straight-grained timber with narrow, tight-grained sap free from open pores allowed (See Grade Rules and Specifications, Page 57). This barrel often is used unlined for such products as beverages, export casings, fruit juices and meats. With various linings (See Linings, Page 68), it is used for acids, alcohol, beverages, liquid chemicals, diamalt, extracts, lacquers, oils, paints, pickles, shellac, soft drink syrups, other syrups, varnish, vinegar, water and similar products.

WHITE OAK BARREL, SOUND SAP: This barrel is made of white oak timber, properly sawed, and should be free from rotten or discolored sap (See Grade Rules and Specifications, Page 57). Lined (See Linings, Page 68), it is used for such products as beverages, boiler compounds, liquid chemicals, cider, denatured alcohol, edible oils, export casings, condensed milk, catsup, extracts, food products, fruit juices, lard and shortening, lubricating oils, other oils, meat, paints, pickles, sauerkraut, solvents, syrups, turpentine, varnish, vegetable oils, vinegar, water, wine and the like.

RED OAK BARREL: This barrel is made from red oak timber, properly sawed, free from discolored and rotten sap (See Grade Rules and Specifications, Page 57). Unlined, it can be used for lard and grease, and similar products. Lined (See Linings, Page 68), it is used for liquid chemicals, greases, lubricating oils, paint, shellac, varnish, beverages, cider, condensed milk, cold pack fruits, fruit juices, food products, liquid soap, malt syrup, pickles, preserves, sauerkraut, vinegar, water, cottonseed oil, compounds, edible oils, molasses, meats, oleo and similar commodities.

GUM BARREL: The gum barrel is made of gum timber, free from discolored and rotten sap (See Grade Rules and Specifications, Page 57). Unlined, it is used for dry chemicals, dry dyes, grease, glucose, gums, lard, paste, syrups, sorghum and similar products. Lined (See Linings, Page 68), it is used for liquid chemicals, oils, compounds, caustic soda, fruits, fruit juices, cold pack fruits, cider, condensed milk, marshmallow, pickles, syrups, sauerkraut, grease, lard, liquid soap, powdered chemicals, silicate of soda, tanning compounds, wax and like products.

ASH BARREL: The ash barrel is made of ash timber, with pumpkin ash not permitted (See Grade Rules and Specifications, Page 57). Unlined, it is used for meat, meat products and fish. Lined (See Linings, Page 68), it is used for such commodities as cider, fruit juices, preserves, syrups, vinegar, meat products, edible oils, greases and other oils.

DOUGLAS FIR BARREL: This barrel is made from live Douglas fir timber, staves and heading to be sawed vertical grain (See Grade Rules and Specifications, Page 57). It is used largely on the West Coast, and can be used for almost all of the products listed for oak, gum and ash barrels.

Heavy Weights

If a tight barrel is to be used to ship heavy weights, consult your local cooper. He will recommend the proper sizes of staves and heading and the proper hoop strength for your product. Additional hoops may add strength to the barrel, and several other methods of reinforcing can be employed. This is a problem for your cooper; do not hesitate to consult him.

Explosives and Dangerous Articles

Rules of the Interstate Commerce Commission and the Bureau of Explosives of the Association of American Railroads govern the shipment of explosives, inflammables and dangerous articles. These must be shipped according to regulations, as it is a penal offense to ship designated articles in violation of the rules. Always consult the I. C. C. and the railroads before making such shipments.

Under these regulations, explosives are classified in three groups, according to risks involved.

Group 1, "dangerous explosives," includes ammunition for cannon, explosive bombs and projectiles, explosive torpedoes, dynamite and similar high explosives, black powder, blasting caps, chemical ammunition, detonating fuses, fulminates, and explosive grenades.

Group 2, "less dangerous explosives," includes products which present a fire hazard, rather than an explosion hazard, such as smokeless powder for cannon and small arms, ammunition for cannon without explosive projectiles, and fireworks.

Group 3, "relatively safe explosives," includes caps, squibs, primers, and small-arms ammunition.

"Other dangerous articles" includes such products as inflammable liquids, inflammable acids, oxidizing materials, corrosive liquids, compressed gases and poisonous substances.

Regulations of the I. C. C. govern the "packing, marking, loading, handling while in transit, and the precautions necessary to determine whether the material when offered is in proper condition for transport."

Tight barrels can be used for several of these products; however, never ship them without first consulting the railroads and the I. C. C.

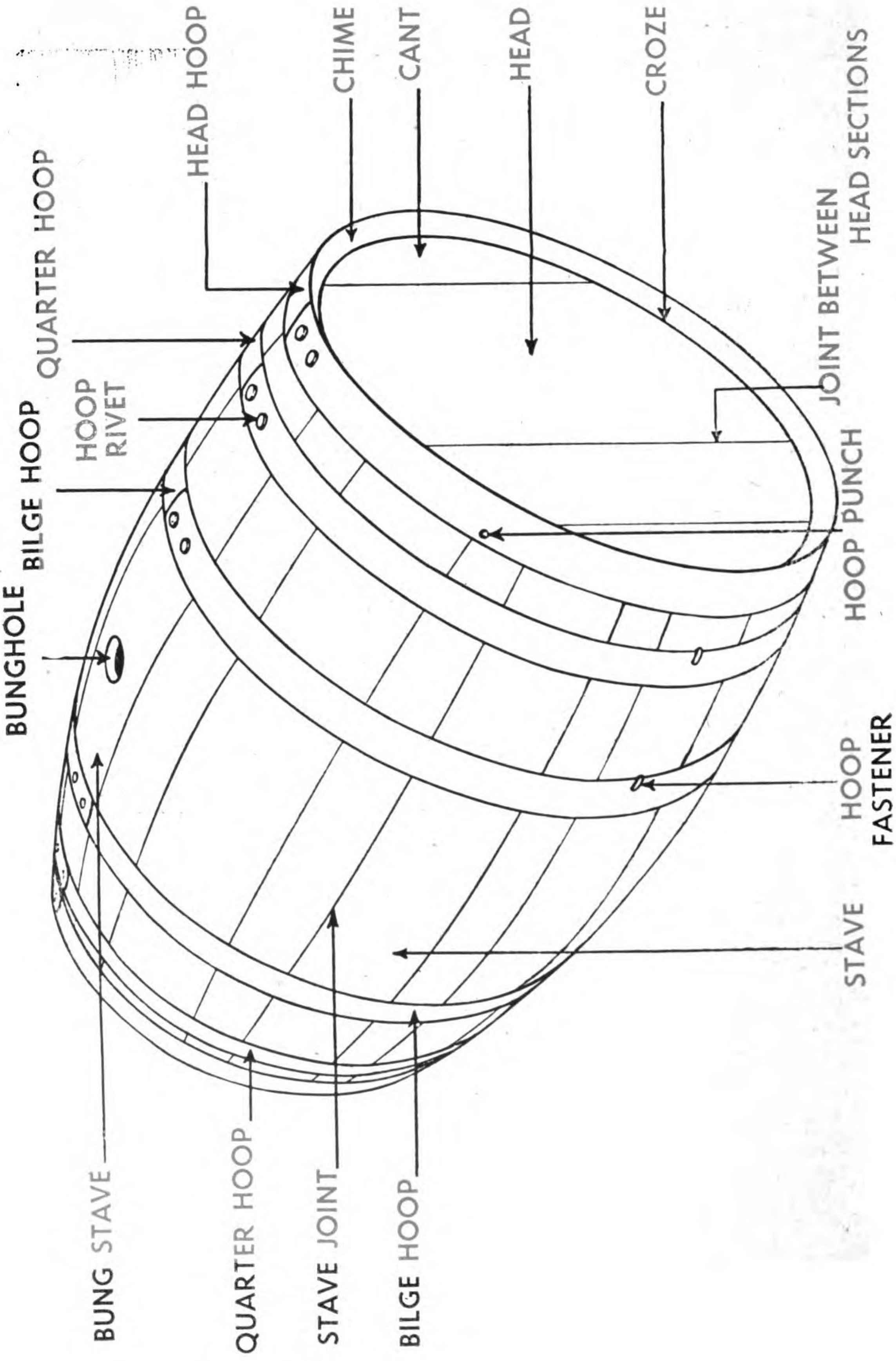
The subject of explosives is well covered in Agent Topping's Tariff No. 4, which may be obtained by writing to W. S. Topping, Agent, 30 Vesey Street, New York, N. Y.

Consult Your Cooper

A cardinal rule in buying tight barrels is never to buy a barrel without consulting with your cooper. The wrong barrel for a product can cause leakage, loss of product and untold headaches.

The wrong lining, too, can be a source of great trouble. If you buy your barrels lined, consult your cooper and read the chapter on Linings (Page 68). If you line your own barrels, the cooper will be glad to instruct you as to the proper linings.

Take the cooper into your confidence; tell him the whole story. Let him be your packaging expert. It will pay you in the end.


BUNGHOLE
BILGE HOOP
HOOP RIVET
QUARTER HOOP
HEAD HOOP
CHIME
CANT
HEAD
CROZE
JOINT BETWEEN HEAD SECTIONS
HOOP PUNCH
HOOP FASTENER
STAVE
BUNG STAVE
QUARTER HOOP
STAVE JOINT
BILGE HOOP

OPENING AND CLOSING

Before Opening

Do not open a tight barrel to fill it unless it is absolutely necessary. Tight barrels usually are filled through the bunghole in the bilge or head (For parts of the barrel, see diagram, Page 42). In some cases, however, it is necessary to fill through the head. If this is the case, select the head to be removed. With a piece of chalk, pencil or other marking device, mark the original position of the head in reference to the staves. In other words, make a mark on the head and extend it up onto the chime (See diagram, Page 42).

Opening

1. Remove the top and second hoops by tapping them with a hand hoop-driver (See Tools, Page 83) and hammer (Figures 35 and 36).

2. Loosen bilge hoop slightly if necessary. Push head down firmly on the side opposite the bunghole until it comes out of croze, allowing enough clearance for easy removal. Or a head-puller (See Tools, Page 83) can be used (Figure 37).

3. Replace head hoop firmly. Keep head off of floor and out of dirt (Figure 38).

4. Tighten quarter hoop slightly. Now drive all hoops firmly in place, using hoop-driver and hammer, and tapping them evenly all around the barrel. When the hoops are tight, the barrel is ready for filling.

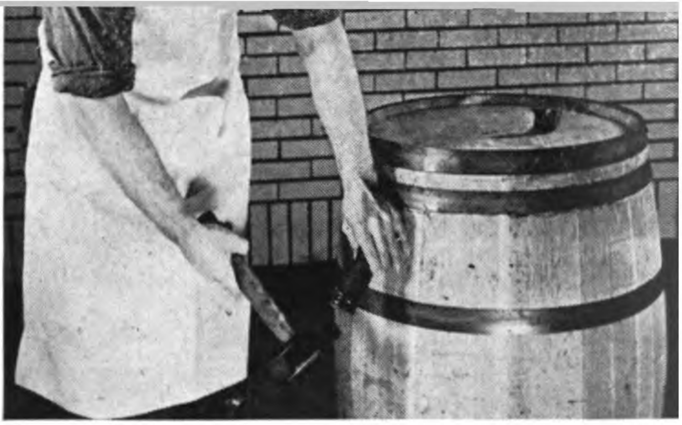


Fig. 35

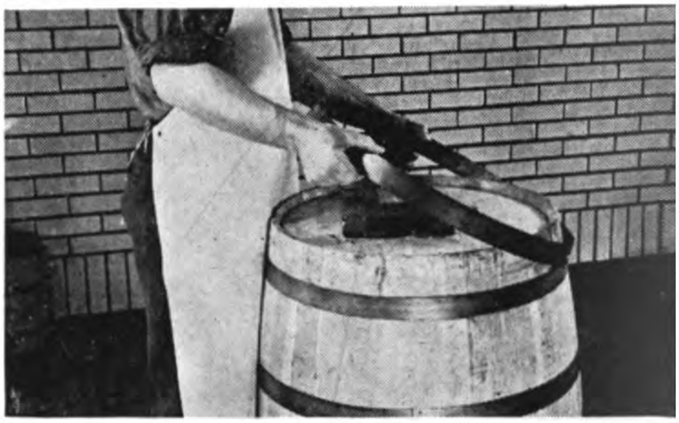


Fig. 36

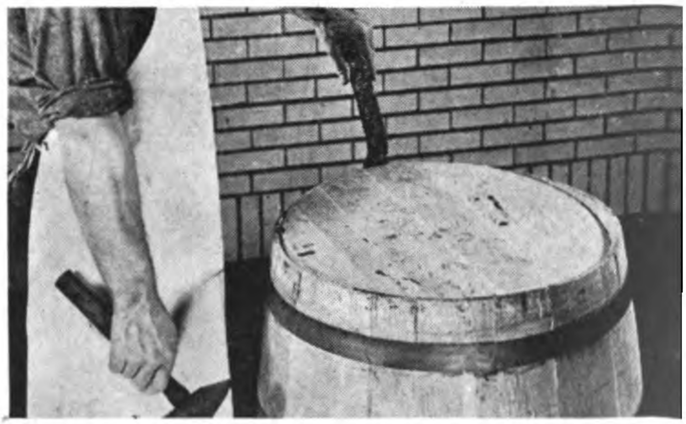


Fig. 37

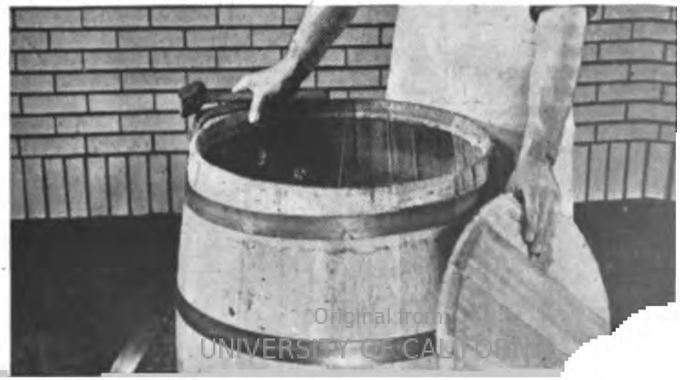


Fig. 38

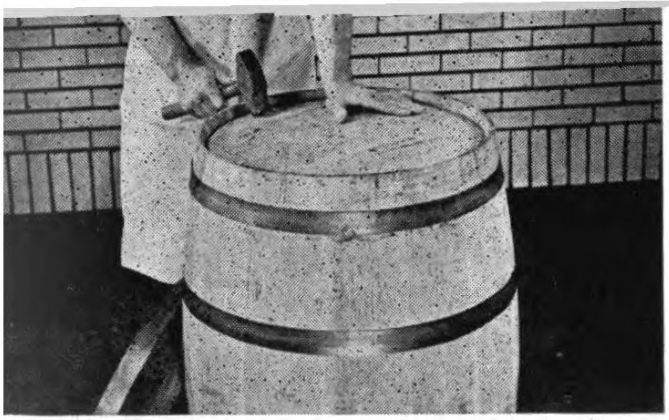


Fig. 39

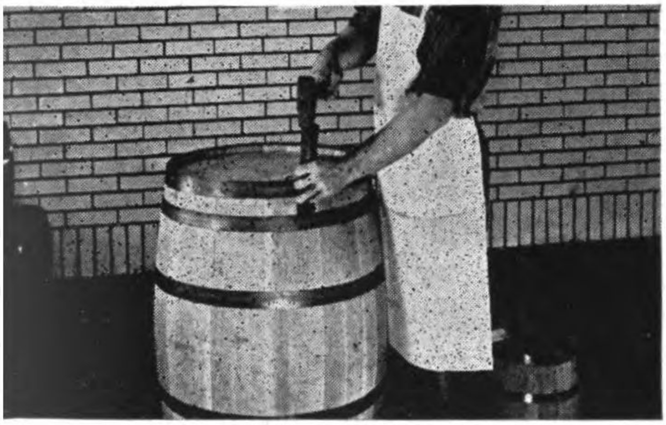


Fig. 40

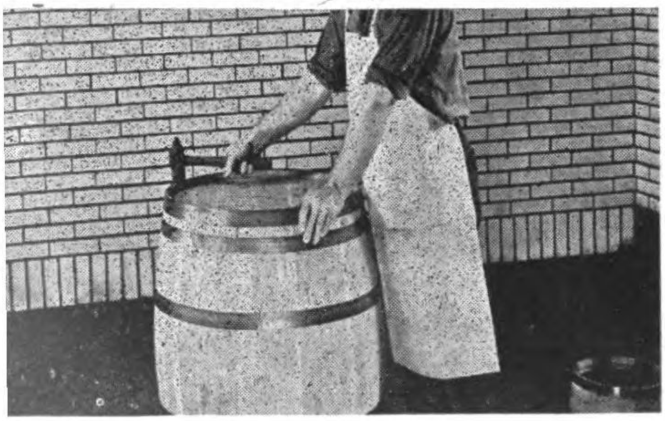


Fig. 41

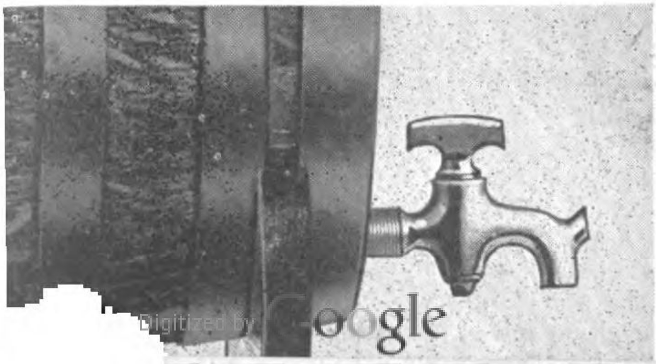


Fig. 42

Filling

Always fill through the bunghole in bilge or in the head when possible. When a barrel has been filled through the bunghole, insert the bung with the grain of the bung running parallel to the grain of the bungstave or head. Do not fill the barrel full to the bunghole. Leave adequate outage space to allow for expansion of the contents. If filling through the open head, simply empty the product into the barrel, allowing space for expansion, and replacement clearance for head.

Replacing Head

To replace the head, remove the head hoop and loosen the second hoop slightly, if necessary, and snap the head into the croze in the same position it formerly occupied, lining up the chalk marks (Figure 39). Be sure the chalk mark on the chime squarely meets the chalk mark on the head. Then replace the hoops and drive them tight with a hand hoop-driver and hammer, working evenly around each hoop (Figure 40). Be sure that all hoops are firmly driven (Figure 41).

Opening Filled Barrel

Follow the same instructions as for opening an empty barrel.

Removing Bung

To remove the bung of a filled barrel, use a wooden bung-starter (See Tools, Page 83), or a wooden mallet. Tap sharply on the bungstave close to the bung on both sides of bung until the bung pops out. Don't drive the bung into the barrel. If the bung is difficult to remove, a bung pick or a bung chisel may be used (See Tools, Page 83).

Emptying Contents

When removing liquids from a barrel through the bunghole, there are several rules to remember. The best way to empty a barrel is to support it on its bilge on a skid or rack so that the product may leave the barrel by gravity. If speedy flow is desired, a vent may be bored in one of the heads after some of the contents have been emptied. If a vent is bored, don't let the chips get into the liquid. Usually, a satisfactory vent can be made with a 10 D nail driven in and then pulled out.

If the barrel is to be emptied through the head, bore an opening in the head diametrically opposite the bilge bung (that is, as far away from the bilge bung as possible). Insert a tapered spigot, faucet or gate (Figure 42). Then lower the barrel so that it rests on the bilge, with the bilge bung on top. The bilge bung then may be loosened to provide a vent while the liquid is drawn off through the spigot. In boring a bunghole, bore it in the center of the head pieces, never at a joint. The hole should never be nearer to the chime than 1 inch, and care should be taken to remove chips or shavings from the product.

Boring holes in the head, for vents or for the removing of the product, is not a desirable practice and should be avoided if possible, as it impairs the reuse or resale value of the barrel. Let the cooper provide necessary openings, properly plugged.

To pump a product from a barrel, stand the barrel on its head and bore an opening in the upper head for the pump. It is difficult to pump from a barrel resting on its bilge. Some cooperage firms are equipped to supply barrels with threaded metal fittings in the head to accommodate standard pumps.

HANDLING AND STORING

Handling by Hand

Tight wooden barrels, because of their "double-arch" construction, are one of the strongest containers known to man. If well made and properly handled, they will give the utmost in service. Most of the troubles experienced with tight barrels can be traced to the inexperience and carelessness of those who handle them.

A tight barrel, although strong and resilient, is not indestructible. Treat it right and it will treat you right.

The barrel has rightfully been called "the container on wheels." Because of its shape, it can be handled by one man, even though loaded with several hundred pounds. Due to its bilge, a barrel rests on a small surface when on its side, reducing friction to a minimum. On its side, the barrel responds readily to a push in any direction. Rolled, it covers distances quickly and with a minimum of effort. On an incline, it moves of its own weight. It is easily turned and guided in any direction, as it pivots on a small contact point.

Rolling

Never roll a barrel on its edge (the chime, see Page 42). This may cause damage to the portion of the staves that extends beyond the head. A barrel is designed to be rolled on its bilge, or side.

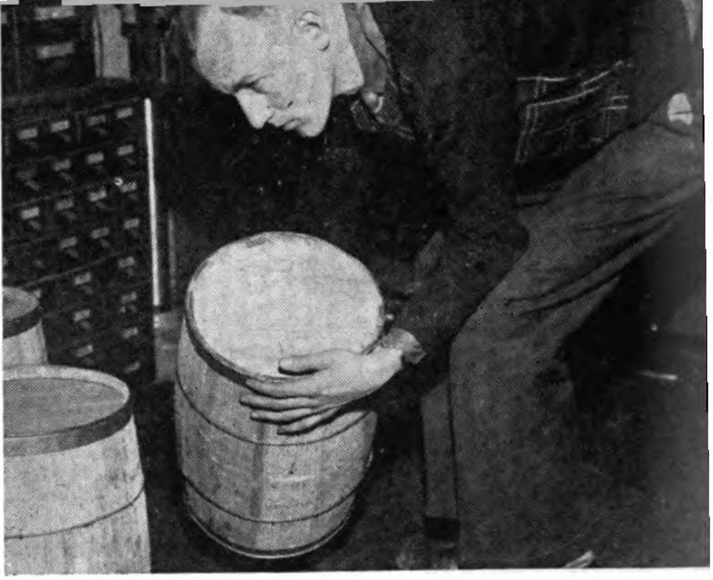


Fig. 43

Never let a loaded barrel drop, even for a few inches. When unloading from a car or truck, use a skid. Do not permit a barrel to roll or slide freely down a skid. **"Ease" it down, and "ease" it to a stop. Do not roll tight barrels over rough surfaces such as cobblestones or tracks.**

Remember, that most tight barrels used to carry liquids are lined with an inner coating of glue, paraffin or silicate. These coatings are sufficiently resilient to withstand the shocks of ordinary handling, but rough treatment may cause the lining to break at the joints, causing the barrel to leak.

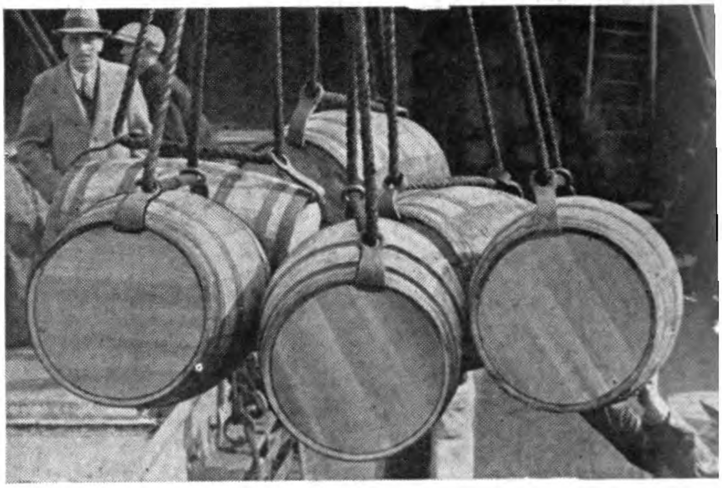


Fig. 44

The upending of a loaded barrel is a simple process. Grasp the barrel firmly by the chime (the ends of the staves which extend beyond the head to form a natural handle). Then rock it back and forth until it rocks into an upright position.

Lifting

A barrel can be lifted without danger to the lifter if he follows a few simple rules. First, stand close to the barrel, feet close together, knees bent. Grasp the barrel firmly. Let the leg muscles do most of the work in the early stages of the lift, until

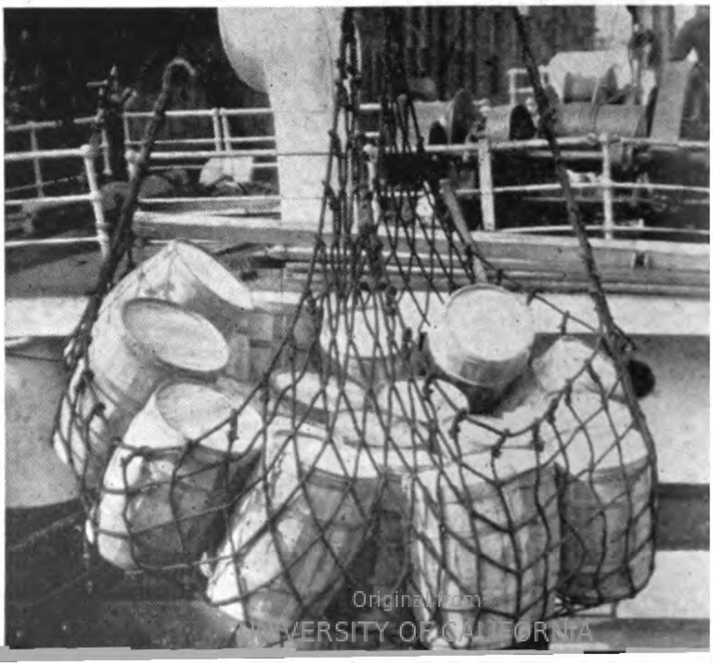


Fig. 45

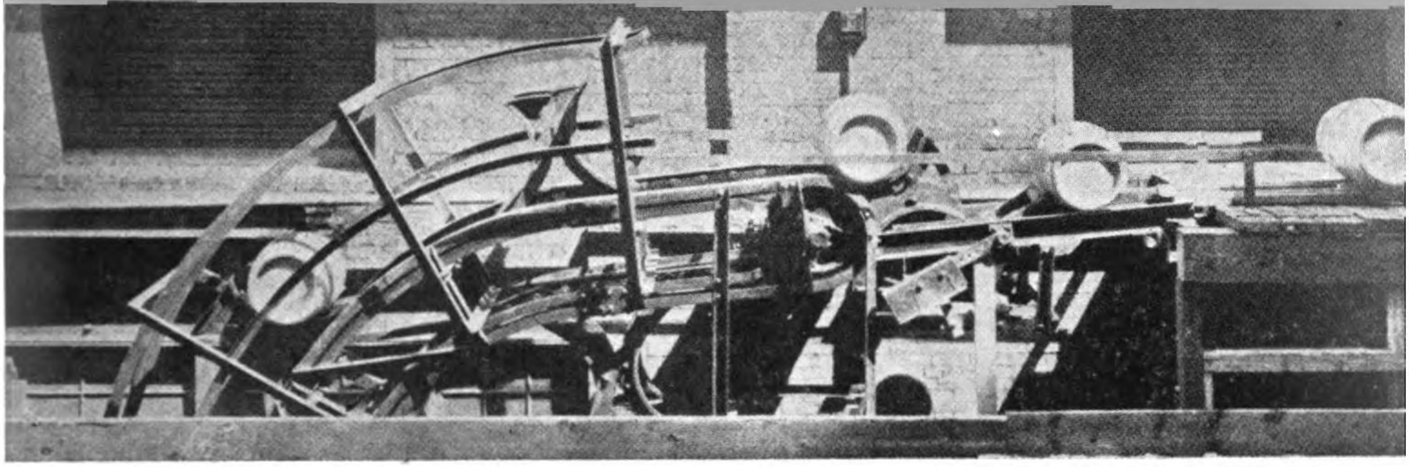


Fig. 47

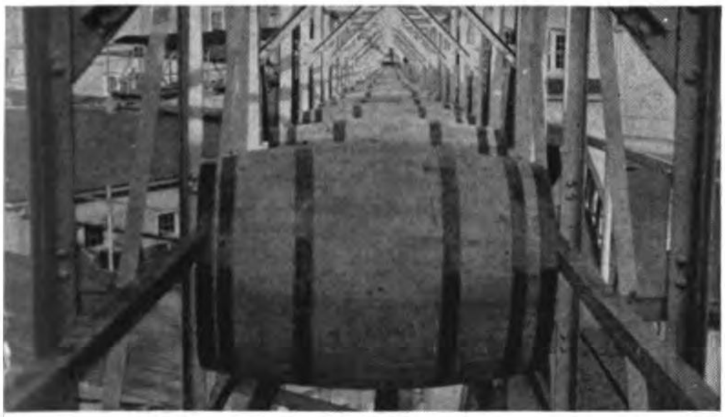


Fig. 46

the back and arm muscles assume the load. With this method, there is little strain on the abdomen and small danger of a rupture. Don't spread feet or lean over as in Figure 43. (See Figure 16, Page 15.)

Loading on Ships

When loading tight barrels on shipboard, chime hooks (Figure 44) or slings should be used. With a sling, approved practice calls for two barrels to the sling with an additional half-turn around one of the barrels to prevent slipping. Never use a loading net for handling barrels at shipside. (Figure 45.)

Mechanical Handling

There are a number of mechanical devices on the market for handling and lifting barrels. These are used by large purchasers of barrels, where speed and efficiency are demanded. The same features that allow the barrel to be moved easily by hand also make it adaptable to speedy handling by machinery.

Inclined tracks (Figure 46), down which the barrel will roll of its own weight, are used in many industries. They can be built of either wood or metal, and the incline should be slight so that the barrel will not move too fast. An incline slope of 1/8" to 1/4" per foot is usually sufficient.

Power conveyors also can be purchased which will meet all handling problems. These conveyors will handle barrels in inclined or horizontal runs, will carry them up or down inclines, and will make right angle turns. Conveyors also are made which will raise and lower barrels, and load and discharge them with automatic kick-offs. "Kangaroo" or "grasshopper" conveyors eliminate manual handling for short lifts without breaking the conveying line. In short, modern conveyors will handle almost any conveying problem. (Figures 47 and 48.)

A variety of machinery is made to handle the lifting and racking of

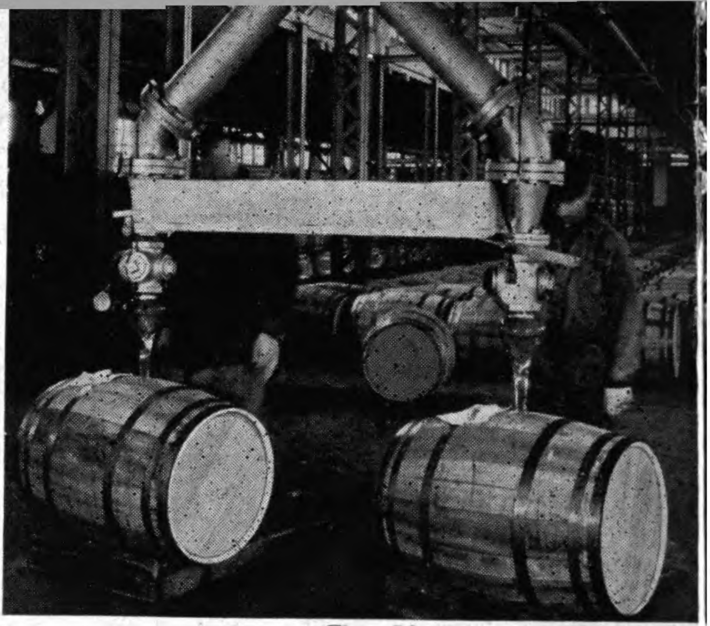


Fig. 50

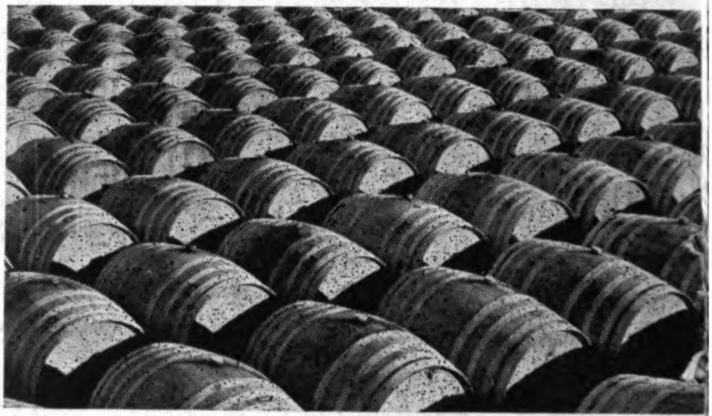


Fig. 51

Fig. 48

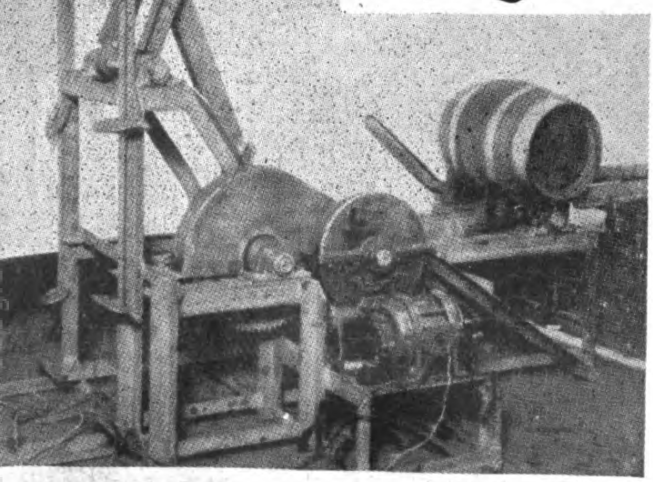
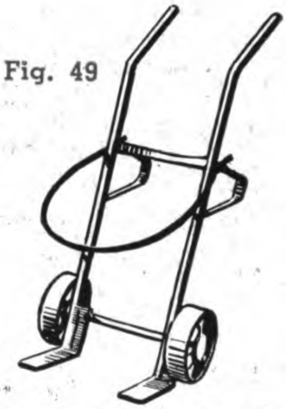


Fig. 49



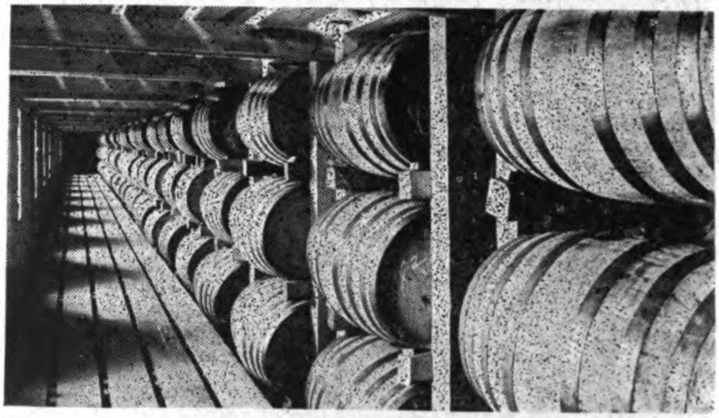


Fig. 52

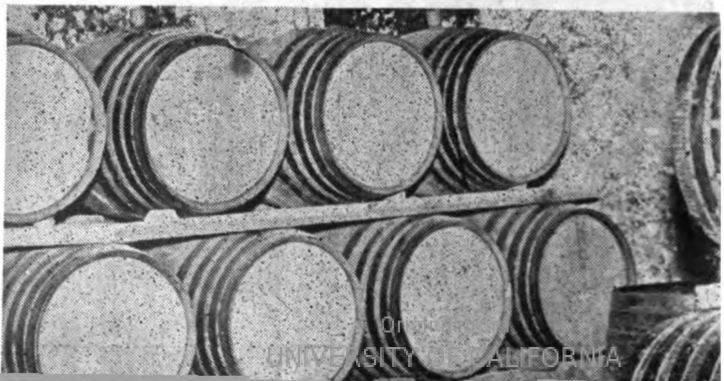


Fig. 53

barrels. Hand and power operated lifters and elevators, as well as portable cranes, are used in many plants. Lifters come in standard capacities of 350, 500, 1,000 and up to 5,000 pounds, and are furnished for any reasonable height. Power-operated machines are preferable when the lift is higher than 16 feet. Cranes, with the ability to reach over piles of material and pick up barrels in the back row, are made with lifting capacities of from 500 to 5,000 pounds. They can be obtained for any reasonable lifting height, with fixed or revolving booms, hand or electrically operated.

Barrel trucks, hand operated (Figure 49) or power operated, are made to handle loads up to 800 pounds. One hand truck has an adjustable bail which can be moved to five different positions to accommodate various sizes of barrels. In loading or unloading, the trucker does not touch the barrel, but merely tilts the truck in an upright position to cause the bail to fall around the barrel; then tilts the barrel against the truck by a slight pull on the handles. Power industrial trucks are available in many sizes and models.

If you are a large user of barrels, and have handling problems, consult the various conveyor manufacturers. They can solve them for you.

Filling and Emptying Machinery

Various machines and devices are available for the filling and emptying of barrels.

In many firms, fillers at the end of the production line flow products directly into the barrel (Figure 50). Barrels may be filled through the bunghole (Figure 50) or through the open head, depending on the product.

Spigots, faucets, gates and pumps are available for emptying barrels. Consult your local cooper as to where to obtain them. Emptying machinery includes elevators and cranes, with tilting devices, which empty barrels into tanks or other receptacles on the production line. Conveyor manufacturers can supply standard equipment, or design equipment to fill your individual needs.

Storing Barrels

The tight barrel, unlike the slack barrel, should never be stored on end. Store it on its bilge or side, *always with the bungstave up* (Figure 51).

The best method of storing tight barrels is on racks (Figure 52). These racks are available in wood and metal, in many sizes and designs, or can be built to specifications. Barrel racks economize on space and prevent the weight of the upper tiers of barrels from resting on the lower tiers. In racks, barrels containing different commodities can be kept on separate tiers. Every barrel is visible and accessible, easily inspected, easily checked for inventory, and easily handled.

Racks often are grouped together, about 15 inches apart, with loading aisles from 4 to 6 feet wide. Racks four high and over usually have runway supports to allow access to the upper tiers. Racks two barrels wide are the best; one-wide is uneconomical, more than two-wide is impractical.

When storing barrels without racks,

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they should be tiered on the bilge on skids (Figure 53), not more than four high. Skids of 2″ x 4″ lumber are satisfactory. The inside edge of the skids should rest on the outside edge of the bilge hoops on both ends of the barrel, the 4″ surface of the skid lying flat on the surface of the barrel. Skids should be placed on the floor for the first tier, and between all tiers. Skids should be tied together to prevent spreading.

Do not store barrels in the open, as temperature changes may cause leakage. Do not store barrels in overheated warehouses, as the staves may dry out, causing the barrel to shrink and the hoops to loosen.

Inspect barrels in storage periodically for "leakers." If a barrel is leaking through a stave or cant of the head, a wooden plug should be inserted. If the barrel is leaking through a joint or at the croze, the hoops may need tightening. Always drive the hoops carefully; a hoop driven too tight may be as bad as hoops that are too loose. Caulking may be necessary to cure obstinate leaks.

Ask your local cooper to show you how to perform these operations. He will be glad to do it.

Plugging Holes in Barrels

If a small leak develops through the stave or heading after a barrel is filled, and this leak is from a worm hole, it should be plugged. Obtain from your cooper a quantity of wooden plugs (shoe pegs). To plug the hole, first take a long, tapered sharp-pointed punch (see ring punch, tools, page 83). Drive the point of this punch into the center of the worm hole approximately ⅜ of an inch. Then hammer one of the wooden plugs (shoe pegs) into this hole until the large end splinters from the force of the driving. After the peg has splintered, a small piece of sand paper rubbed across the top of the plug will break loose the splintered ends, making the end of the plug level with the outside of the barrel.

INTERSTATE COMMERCE COMMISSION REGULATIONS

Shipping Container Specifications 10-A, 10-B and 10-C
(Revised effective January 7, 1941)
Wooden Barrels and Kegs, Tight

SPECIFICATIONS 10-A

General

1. Compliance.—Required in all details.

Material

2. Staves and heading. — To be of white oak, chestnut oak, red oak, black cherry, or Douglas fir; quarter-sawed with the grain, from straight-grained timber, so no annual ring shall slope over half the thickness of stave or head; thoroughly kiln-dried, moisture content 7% to 11%; free from rotten sap, checks, pitch pockets, cat faces, seed and worm holes in excess of 15 in one container, and other defects that show through on both sides.

3. Hoops. — To be of cooperage-grade hoop steel.

Construction

4. Staves.—To be sawed evenly and circular; croze center to be within 1⅛" of end of stave; stave end to have ⅛" free from bevel.

5. Heading.—Of uniform thickness and properly circled; planed on outside and properly jointed and glued, or doweled and flagged; dowel diameter not over 5/12 thickness of head.

6. (a) The barrel.—Stave joints reasonably flush on outside. Lathing is forbidden.

(b) Worm and seed holes to be plugged; over 15 not authorized in one container.

7. (a) Parts required and dimensions.—As follows (10% excess capacity authorized).

(b) Staves, when finished on outside (See Table 1):

Table 1 thicknesses are of staves finished on one side. One-sixteenth inch must be added for unfinished staves.

Table 1 maximum lengths are authorized to be increased 6% or less, provided the thickness of stave is increased at least 1/16 inch for each increase of 1 inch in length or fraction thereof.

(c) Heading, after planing (See Table 2):

Table 1

Capacity of Container, Not over	MAXIMUM			MINIMUM	
	Length	Width	Bilge Circle	Staves	Thickness
Gallons	Inches	Inches	Inches	Number	Inch
50	34	6	84	19	¾
30	30	5	74	16	⅝
15	24	4½	54	14	9/16
10	22	4¼	50	12	½
5	18	4	40	10	½

Table 2

Capacity of Container, Not over	MAXIMUM		MINIMUM	
	Pieces	Diameter	Thickness	Width
Gallons	Number	Inches	Inch	Inches
50	6	21	1	2½
30	6	18	11/16	2½
15	5	14	11/16	2
10	5	13	⅝	2
5	4	11	⅝	2

(d) Hoops, number and sizes (See Table 3):

Table 3

Capacity of Container, Not over (Gallons)	Minimum Number of Hoops	MINIMUM SIZE OF HOOPS (Inches in Width and Birmingham Gage)							
		Head		1st Quarter		2nd Quarter		Bilge	
		Inch	Gage	Inch	Gage	Inch	Gage	Inch	Gage
50	8	1¾	16*	1½	18	1½	18	1¾	17
30	6	1½	17	1¼	19	......	....	1½	18
15	6	1¼	18	1⅛	19	......	....	1¼	19
10	6	1⅛	19	1	19	......	....	1⅛	19
5	6	1⅛	19	1	19	......	....	1	19

*NOTE: Because of the present emergency and until further order of the Commission, head hoops of 17 gage are authorized.

Closures

8. Closures.—To be such as to prevent leakage in transit. Bungholes in staves must be not over 2″ in diameter.

Lining

9. Lining.—To be as prescribed in the regulations or otherwise appropriate for the contents.

Tests

10. Type test.—Sample container at least 2 days old shall not increase more than 10 per cent on diameter of head when all hoops above bilge are removed.

11. Leakage test.—Required for each lined container; by pressure at time of sizing or air pressure of at least 5 pounds per square inch; leakers to be repaired and retested.

Marking

12. On each container.—By the maker. By hot branding iron on head as follows:

(a) ICC—10A. This mark shall be understood to certify that the container complies with all specification requirements.

(b) Name or symbol (letters) of maker; this must be registered with the Bureau of Explosives and located just above, below, or following the mark specified in (a).

(c) Date of manufacture (for example, 7-28 for July, 1928) located near the maker's mark.**

**NOTE—Because of the present emergency and until further order of the Commission, date of manufacture may be omitted.

13. Size of markings (minimum).—¾″ high for over 30-gallon size, ½″ for others.

* * *

SPECIFICATION 10-B

Containers must comply with specification 10-A except as follows (paragraph references are to specification 10-A):

7. (b) Staves, when finished on outside: (See Table 4).

Table 4

Capacity of Container, Not over	MAXIMUM			MINIMUM	
	Length	Width	Bilge Circle	Staves	Thickness
Gallons	Inches	Inches	Inches	Number	Inch
50	34	6	84	19	11/16
30	30	5	74	16	⅝
15	24	4½	54	14	9/16
10	22	4¼	50	12	½
5	18	4	40	10	½

Table 4 thicknesses are of staves finished on one side. One-sixteenth inch must be added for unfinished staves.

Table 4 maximum lengths are authorized to be increased 6 per cent or less, provided the thickness of stave is increased at least 1/16 inch for each increase of 1 inch in length or fraction thereof.

7. (c) Heading, after planing: (See Table 5).

Table 5

Capacity of Container, Not over	MAXIMUM		MINIMUM	
	Pieces	Diameter	Thickness	Width
Gallons	Number	Inches	Inch	Inches
50	6	21	¾	2½
30	6	18	⅝	2½
15	5	14	9/16	2
10	5	13	½	2
5	4	11	½	2

7. (d) Hoops, number and size: (See Table 6).

Table 6

Capacity of container, Not over (Gallons)	Minimum Number of Hoops	MINIMUM SIZE OF HOOPS (Inches in Width and Birmingham Gage)							
		Head		1st Quarter		2nd Quarter		Bilge	
		Inch	Gage	Inch	Gage	Inch	Gage	Inch	Gage
50	8*	1¾	17	1½	18	1½	18	1¾	17
30	6	1½	18	1¼	19	......	....	1½	18
15	6	1¼	19	1⅛	19	......	....	1¼	19
10	6	1⅛	19	1	19	......	....	1⅛	19
5	6**	1	19	1	19	......	....	1	19

***NOTE: Because of the present emergency and until further order of the Commission, the minimum number of hoops is authorized to be reduced to 6 by eliminating second quarter-hoops.**

****NOTE: Because of the present emergency and until further order of the Commission, the minimum number of hoops is authorized to be reduced to 4 by eliminating first quarter-hoops if head and bilge hoops of 1¾ inch by 17 gage are used.**

12. (a) ICC-10-B. This mark shall be understood to certify that the container complies with all specification requirements.

SPECIFICATION 10-C

Containers must comply with specification 10-A except as follows (paragraph references are to specification 10-A):

7. (b) Staves, when finished on outside: (See Table 7).

Table 7

Capacity of Container, Not over	MAXIMUM			MINIMUM	
	Length	Width	Bilge Circle	Staves	Thickness
Gallons	Inches	Inches	Inches	Number	Inch
50	34	6	84	19	11/16
30	30	5	74	16	⅝
15	24	4½	54	14	9/16
10	22	4¼	50	12	½
5	18	4	40	10	½

Table 7 thicknesses are of staves finished on one side. One-sixteenth inch must be added for unfinished staves.

Foregoing maximum lengths are authorized to be increased 6 per cent or less, provided the thickness of stave is increased at least 1/16 inch for each increase of 1 inch in length or fraction thereof.

7. (c) Heading, after planing: (See Table 8).

Table 8

Capacity of Container, Not over	MAXIMUM		MINIMUM	
	Pieces	Diameter	Thickness	Width
Gallons	Number	Inches	Inch	Inches
50	6	21	¾	2½
30	6	18	⅝	2½
15	5	14	9/16	2
10	5	13	½	2
5	4	11	½	2

7. (d) Hoops, number and size: (See Table 9).

Table 9

Capacity of container, Not over (Gallons)	Minimum Number of Hoops	MINIMUM SIZE OF HOOPS (Inches in Width and Birmingham Gage)							
		Head		1st Quarter		2nd Quarter		Bilge	
		Inch	Gage	Inch	Gage	Inch	Gage	Inch	Gage
50	6	1¾	17	1½	18	......	....	1¾	17
30	6	1½	18	1¼	19	......	....	1½	18
15	6	1¼	19	1⅛	19	......	....	1¼	19
10	6	1⅛	19	1	19	......	....	1⅛	19
5	6	1	19	1	19	......	....	1	19

12. (a) ICC-10-C. This mark shall be understood to certify that the container complies with all specification requirements.

GRADE RULES

Grade Rules and Specifications Adopted by the Tight Cooperage Group of The Associated Cooperage Industries of America, Inc.

Section 1

WHITE OAK BUCKED BOURBON BARREL STAVES

Shall be manufactured of white oak and species of white oak that will be suitable for the purpose, to be equalized 34, 35 or 35½ inches long, as agreed, to be, when thoroughly kiln-dried, ⅞ inch thick, and to average in width when close jointed, free of sap, not exceeding 22 staves to the barrel of 81″, and to be free of seed or worm holes of any kind, cat faces or checks, and crooks inside or outside. (A twist, not varying to exceed ¾ inch from a straight line shall be allowed.) Crooks with hollow to back of stave, not exceeding ½ inch in variation to 12 inches in length, shall be allowed. Reverse crooks not admitted. Sound streaks that do not go through stave will be admitted, provided they are on the inside of stave and over 6 inches from ends.

(See Notes I, II, IV, V and VII following.)

Section 2.

BUCKED ALCOHOL AND WHISKY BARREL STAVES

Same specifications as bucked bourbon staves, except length is to be 34 inches, and thickness ¾ inch after being thoroughly kiln-dried.

(See Notes I, II, IV, V and VII following.)

Section 3

SAWED SPIRIT BOURBON AND RYE WHISKY BARREL STAVES

Shall be manufactured of sound, live white oak and species of sound, live white oak that will be suitable for the purpose, sawed with the grain from straight grain bolts, and equalized 34, 35 or 36 inches long, as agreed, to be evenly sawed and of uniform thickness throughout, and when thoroughly kiln-dried to be full ¾, ⅞ or 1 inch thick, respectively, when planed on inside or outside; and full 13/16, 15/16 and 1-1/32 inches thick, respectively, when not planed. To average in width when kiln-dried and jointed, free of sap, not exceeding 25 staves, to the barrel of 81 inches, and to be free of seed or worm holes of any kind, cat faces or checks, but permitting in five per cent of a shipment one worm hole in a stave, provided there is no sign of defect around the worm hole. One pore streak that does not go through stave will be admitted, provided it is on inside of stave and does not go into the stave more than ⅛ inch deep. The grain of the stave must be such that a straight line drawn at right angles across the thickness at the ends of a stave must pass through not less than three lines of grain at any one place, but in no case shall the angle of the grain be greater than 45 degrees.

(See Notes I, II, IV, V and VII following.)

Section 4

BUCKED OR SAWED HALF WHISKY AND ALCOHOL STAVES

Same specifications as above (Sec. 3), length 26 inches to 30 inches, as agreed, thickness 11/16 or ¾ inch, as agreed, and to average in width when close jointed and free of sap not less than 19 staves to a half-barrel.

(See Notes I, II, IV, V and VII following.)

Section 5

SAWED WINE BARREL STAVES

Shall be manufactured of white oak and species of white oak that will be suitable for the purpose, sawed with the grain from straight grain bolts, and equalized, 34 inches long, and to be when kiln-dried and planed on both sides, 11/16 inch thick, and when planed on one side to be ¾ inch scant thick; to average in width when close jointed, free from sap, not exceeding 25 staves to the barrel of 81″. Slight defects not showing through on both sides, admissible.

(See Notes I, II, IV, V and VII following.)

Section 6

WHITE AND RED OAK OIL BARREL OR TIERCE STAVES

Shall be equalized, 34, 35 or 36 inches long as agreed, and to be when thoroughly dry, ¾ inch thick, evenly sawed and of uniform thickness throughout; to average in width when close jointed, including sound sap, not exceeding 25 staves to the standard barrel. To be free from seed holes, cat faces which show through on both sides, wind shakes and rotten sap.

It will be permissible to furnish kiln-dried and jointed staves of the above dimension, in bundles not to exceed 25 staves to a bundle, provided said bundles contain at least 10% wide staves for bung staves averaging not less than 4 inches.

(See Notes following.)

Section 7

TURPENTINE BARREL STAVES

Shall be equalized, 34 inches long, and to be when thoroughly kiln-dried and planed, not less than ¾ inch thick, evenly sawed, and of uniform thickness throughout; to average in width when close jointed, including sound sap, not exceeding 25 staves to the standard barrel. To be free from seed holes, cat faces, rotten sap, wood want or proof.

(See Notes I, IV, V and VII; also Note II as to length only.)

Section 8.

CUBAN TIERCE STAVES

Shall be equalized 35 inches long, and when thoroughly dry, to measure 1 inch thick, otherwise to grade same as ¾ inch oil or tierce; to average in width, when close jointed, including sap, not exceeding 25 staves to a barrel.

(See Notes following.)

Section 9

PORK STAVES

Shall be made of white oak, red oak

or ash, as agreed. Shall be equalized, 30 inches long, and when thoroughly dry, to measure ⅝ inch thick, evenly sawed, and of uniform thickness throughout; to average in width, when close jointed, including sound sap, not exceeding 19 staves to the barrel. To be free from seed holes, cat faces, wind shakes and rotten sap. Slight defects not showing through on both sides of staves admissible. Pumpkin Ash not permitted.

(See Notes following.)

Section 10

GUM STAVES

Gum staves shall be the same specifications as oil barrel staves 34 or 36 inches in length, as agreed, and manufactured of gum timber; tupelo gum not permitted unless otherwise agreed upon. (See notes.)

Section 11

HALF BARREL GUM STAVES

Half barrel gum staves shall be the same specifications as the whole barrel gum stave, either ⅝ or ¾ inch thick, as agreed, and 30 inches and under in length, as agreed.

All gum staves 30 inches and under shall be sawed ¾ or ⅝ inches, as agreed, otherwise specifications same as whole barrel gum staves. (See notes.)

Section 11A

GUM MIXED TIMBER

Unless otherwise specified, gum mixed timber may include sycamore, ash, elm, cottonwood, maple, basswood and beech.

Section 12

MILL RUN WHITE OAK STAVES

Mill run white oak staves shall consist of the run of the saw, and grade oil staves and/or better. (See notes.)

Section 13

No. 2 TIGHT BARREL STAVES DOG STAVES

The grade of No. 2 Tight Barrel Staves, and Dog Staves, shall be that agreed upon between the seller and the purchaser.

NOTES

Note I.—All Staves must be evenly equalized, so as to be square on the ends.

Note II.—Variations in staves. All staves must not be less than the standard measurement herein stated, but if ⅛ inch shorter or longer, or 1/16 inch over or under specifications in thickness on one edge, will not affect the grade.

Note III.—Worm Holes. Sound worm holes in sawed oil tierce or pork staves, not exceeding two in a straight line across the width of the staves, not more than five worm holes in any one stave, and 10 per cent of the number of staves in carload, will be admitted.

Note IV.—All staves must have a proper circle; no flat staves will be accepted. A twist not varying to exceed ¼ inch from straight line shall be allowed.

Note V.—When not otherwise agreed the following average widths shall apply as a basis of purchase and settlement: All staves over 30 inches in length, 4½ inches; all staves (including cut offs) 26 to 30 inches inclusive in length, 4¼ inches; under 26 inches and over 18 inches (including cut offs), 4 inches; 18 inches and under (including cut offs), 3½ inches.

Note VI.—Unless otherwise specified by the buyer, all oil barrel staves averaging 18 to 81 inches shall be jointed with a ¾ inch bilge, and for each stave in excess of 18 staves the bilge shall be reduced 1/16 of an inch.

Note VI-a.—Unless otherwise specified, kiln dried and jointed staves shall measure to the set at the bilge as follows:

34″ and larger	81″
28″ to 30″ inclusive	68″
24″	56″
21″ to 22″	48″
16″ to 17″	39″

Note VII.—No regularly sawn or cut off stave 30 inches in length or over, when jointed shall be under 1½ inches or more than 5½ inches in width at bilge, and no regularly sawn or cut off stave under 30 inches in length, when jointed, shall be under 1½ inches or more than 4½ inches in width at bilge; when exceeding those widths ¾ of an inch shall be allowed for splitting.

No regularly sawn or cut off stave 30 inches in length or over, when air dried and listed, shall be under 2 inches in width or over 6 inches in width at bilge, and the general average shall not be less than 3.25 inches in width basis to the shipment.

On all cut off staves a variation of 1 inch over the length ordered, should be permissible.

Note VII-a.—Mill run cut off staves shall mean staves less than 34 inches in length which have been made from longer staves that were strictly mill run and there shall be no sorting either before or after the stock is cut down. These short staves as well as the 34 inch shall grade oil grade or better.

Note VIII.—A close list on oil staves shall be permitted to show one-third the thickness of stave or wood want on the outside, measuring at the bilge.

On Tight Staves, kiln dried and jointed, it will be permissible to leave wood want of not to exceed one-sixteenth of an inch in depth on the outside, measuring at the bilge of the stave.

Note IX.—White Oak, Red Oak, and Gum Staves shall be planed on the inside when used for food purposes, and to be not less than ¾ of an inch in thickness when planed.

Staves to be used for food barrels must be so specified by the buyer at the time order is placed.

(Note that this does not prevent parties contracting for staves on basis of any other width if they prefer. These specifications are to apply where there is no specific agreement.)

STANDARD SPECIFICATIONS — TIGHT BARREL HEADING

(Circled)

Section 1

BOURBON BARREL HEADING

Shall be made out of white oak and species of white oak, free of sap, that will be suitable for the purpose. All heading shall be sawed with the grain from straight grained timber, properly seasoned, thoroughly kiln-dried, properly jointed, dowelled and flagged and to be 1 inch thick when finished.

Heading shall be planed on face side and uniformly circled to the required size not to exceed 20⅞ inches in diameter. Where heading is to be recircled by the purchaser the allowance of wood want on the bevel to make the required size, to be agreed upon by the buyer and seller.

Sound streaks that do not go through heading will be admitted provided they are on inside of head and not over ¼ inch deep showing in ends of piece; and one sound worm hole in not over 5 per cent of pieces allowed. (This paragraph to apply also to square heading.)

Section 2

⅞ IN. WHISKY OR BOURBON BARREL HEADING

Same specifications as 1 inch bourbon barrel heading except that it shall be ⅞ inch in thickness when finished.

Section 3

SPIRIT BARREL HEADING

Same specifications as bourbon barrel heading except that it shall be ¾ inch in thickness when finished.

Section 4

WINE BARREL HEADING

Same specifications as bourbon barrel heading except that it shall be 11/16 inch or ¾ inch in thickness, as agreed. Slight defects not showing through on both sides are permissible.

Section 5

HALF BARREL SPIRIT HEADING

Same specifications as whole spirit barrel heading except that it shall be not less than 11/16 inch in thickness and not exceeding 17½ inches in diameter.

Section 6

HALF BARREL WINE HEADING

Same specifications as whole wine barrel heading except that it shall be not less than 11/16 inches in thickness and not exceeding 17½ inches in diameter.

Section 7

WHITE OAK OIL BARREL HEADING

Shall be made of white oak timber and its species. Shall be evenly sawed, practically with the grain, and of uniform thickness, properly seasoned, thoroughly kiln-dried, properly jointed, dowelled and flagged, and to be ¾ inch thick when finished.

Heading shall be planed on face side and uniformly circled to the required size not to exceed 20¾ inches in diameter unless otherwise agreed. Cat faces which do not show through on both sides, discolored sound sap will be permitted. No rotten sap permitted.

No head to contain more than fifteen (15) properly plugged worm holes and not more than five (5) in any one piece, and not more than ten per cent (10%) of the car to be so plugged. No plugged worm holes in the top bevel of the head permissible.

Section 8

RED OAK OIL BARREL HEADING

Same specifications as white oak oil barrel heading except that it shall be made of red oak timber and its species.

Section 9

PORK BARREL HEADING

Shall be made of white oak, red oak, or ash timber and of the same specifications as the oil barrel heading, except that it shall be ⅝ inch in thickness, not exceeding 17½ inches in diameter, unless otherwise agreed.

Section 10

ASH TIERCE HEADING

Same specifications as oil barrel heading except that it shall be manufactured of ash timber. Pumpkin ash not permitted.

Section 11

TURPENTINE BARREL HEADING

Shall be made of white oak timber and its species or white ash timber. Same specifications as oil barrel heading except as follows: Two wormholes properly plugged in each piece of heading and one cat face which does not go through, in each head, shall be permitted. No discolored sap permitted. No pumpkin ash permitted.

White oak heading shall be ¾ inch to 1 inch in thickness. White ash heading shall be 15/16 inch to 1 inch thickness and shall not exceed 20¾ inches in diameter. (See Section 22.)

Section 12

GUM BARREL HEADING

Same specifications as oil barrel heading except that it shall be manufactured from gum timber and shall not exceed 21 inches in diameter. (See Section 22.)

Section 13

GUM HALF BARREL HEADING

Same specifications as gum barrel heading except that it shall be not less than ⅝ inch in thickness and not exceeding 17½ inches in diameter.

Section 14

KEG HEADING

Shall be of the same specifications as to grades governing the different classes of whole barrel heading and shall not be less than ⅝ inch in thickness, and diameter as agreed upon by buyer and seller.

In ordering keg heading it shall be specified whether dowelled and flagged or glued heading is desired.

Section 14-A

No. 2 TIGHT BARREL HEADING

All tight barrel heads that are not suitable for No. 1 grade, shall be classed as No. 2 grade, and all knots and knot holes to be permissible in No. 2 grade heading.

Section 14-B

DOG HEADING

The grade of Dog tight barrel heading shall be that agreed upon between the seller and the purchaser.

Section 14-C

WOOD WANT

On Tight Heading it will be permissible to leave wood want of not to exceed one-eighth of an inch on the inside of the heading.

Section 14-D

All grades of heading to be composed of not exceeding six pieces and no piece of the heading shall be under 2½ inches. All middle pieces should be so dowelled that dowel holes will not meet in the same piece of heading. No cants allowed under 3 inches in width after being recircled by the buyer.

NOTE: White Oak and Red Oak Oil Barrel Heading, Ash Tierce and Gum Barrel Heading, circled, shall be planed on both sides when used for food barrel purposes and to be not less than 11/16" in thickness when planed.

Heading to be used for food barrels must be so specified by the buyer at the time order is placed.

STANDARD SPECIFICATIONS — TIGHT BARREL HEADING

(Square)

Section 15

BOURBON BARREL HEADING

Shall be sawn from white oak timber, suitable for the purpose and with the grain as nearly as practicable, but in no case shall the angle of the grain be greater than 45 degrees.

Thickness when air dried to be such as will finish 1 inch; but in no case shall heading be sawed green under 1-3/16 inches in thickness.

Bird pecks, also shallow cat faces and spot worms, on one side, which do not penetrate more than ⅛ inch, will be permissible, but in not over 5 per cent of pieces.

Porous streaks on one side, that do not go through the heading and are not over ¼ inch deep, showing in end or ends of piece, are permissible.

One sound worm hole in not over 5 per cent of pieces permissible, except no worm hole that would appear in top bevel of head, is permitted.

Section 16

SPIRIT BARREL HEADING

For grade, see Sec. 15, except thickness when air dried to finish full ¾ inch.

Section 17

WINE BARREL HEADING

For grade, see Sec. 15, except slight defects not showing through on both sides, permissible.

Section 18

OAK AND ASH OIL BARREL AND TIERCE HEADING

Cat faces, bird pecks and spot worms, which do not show through on both sides, permissible.

Streaks and discolored sound sap (no rotten sap), permissible.

Not to exceed 5 worm holes in one piece and in not more than 10 per cent of pieces, permissible.

No Pumpkin Ash permitted.

Section 19

ASH PORK BARREL HEADING

For grade, see Sec. 18. Length 19 inches, thickness when air dried to finish ⅝ inch.

Section 20

TURPENTINE BARREL HEADING

White Oak and Ash. For grade, see Sec. 18. Exception: not to exceed 2 worm holes and 1 cat face, which does not go through head, permitted. No discolored sap or Pumpkin Ash permitted. Thickness to be agreed upon between buyer and seller.

Section 21

LENGTH AND THICKNESS

Unless otherwise specified, the length of whole barrel heading shall be 22 inches.

Thickness when air dried, to finish ¾ inch or 11/16 inch as agreed.

Section 22

HALF BARREL

Unless otherwise specified, standard length of half barrel heading shall be 19 inches.

Thickness when air dried, to finish ⅝ inch to 15/16 inch, as agreed.

Section 23

WIDTH

Minimum width of whole barrel heading 2¾ inches, cants 3¼ inches.

Minimum width of shorter heading, 2 inches, cants 2½ inches.

Section 24

CANTS

On all square heading 25 per cent of cants shall be accepted.

Section 25

MEASUREMENT

Bourbon, Spirit and Wine Barrel Heading shall be measured free of sap. On all other heading, measurement shall include sap. On sap free heading, measurement shall be from inside edge of sap.

Regardless of width of the blank (on whole barrel heading):

20 inch cants shall measure not to exceed 7½ inches.

19 inch cants shall measure not to exceed 6 inches.

18 inch cants shall measure not to exceed 5 inches.

17 inch cants shall measure not to exceed 4 inches.

16 inch cants shall measure not to exceed 3½ inches.

15 inch cants shall measure not to exceed 3¼ inches.

Section 26

Where there is at least 2¾ inches width of acceptable heading under these grade rules on both sides of a split or defect in piece, both pieces shall be measured and the total measurement apply to one piece.

Section 27

Whole Barrel Heading must measure not over 12 pieces to the set of 44 inches.

Section 28

KEG HEADING

For grade, see respective sections covering heading of like grade.

Unless otherwise specified, the following shall apply:

5 Gal. 2″ and wider, 11″ length, 11/16″ thickness.

10 Gal. 2″ and wider, 13″ length, ¾″ thickness.

15 Gal. 2″ and wider, 14½″ length, ¾″ thickness.

20 Gal. 2″ and wider, 16″ length, 13/16″ thickness.

25 Gal. 2″ and wider, 18″ length, 13/16″ thickness.

* * *

STANDARD SPECIFICATIONS FOR MEASURING FLAG

Section 1

24 inch butt flag shall measure 27 inches in circumference at the center, tied reasonably tight and well cured or seasoned.

* * *

EXPORT SPECIFICATIONS

Definitions

(a) TIGHT BARREL: A tight barrel is a bulging, cylindrical coopered wood container made of staves, heads, and hoops, and made sufficiently tight to hold liquids without leaking.

(b) STAVE: A stave is an arched vertical component forming the walls or sides of a barrel.

(c) HEAD: A head is the rounded circular wood member forming the ends of a barrel.

(d) HOOPS: Hoops are annular steel strips used to hold a barrel together.

(e) BILGE: The bilge is the largest circumference of a barrel, located at a horizontal plane through its center.

Materials

(a) STAVES AND HEADING: Staves and heading should conform in quality with the grading rules and specifications of The Associated Cooperage Industries of America, Inc. (See preceding chapter).

(b) Staves and heading shall be made of any of the following woods: white oak, red oak, gum, ash (pumpkin ash not permitted), Douglas fir.

(c) DEFECTS: Each piece of wood shall be free from knots, checks, rotten sap, pitch pockets, seed and worm holes in excess of 15 (properly plugged) in one container, and other defects.

(d) Each piece of wood shall be quarter-sawed from straight grained timber so that no annual ring shall slope over half the thickness of the piece.

(e) Each piece of wood shall be thoroughly dried to not less than 7% nor more than 11% moisture content at time of manufacture.

(f) HOOPS: Hoops shall be of cooperage grade hoop steel.

Construction

(g) STAVES: The staves shall be sawed evenly and circularly. Croze center shall be 1⅛″ from end of stave.

(h) HEADING: The heading shall be uniform in thickness, properly circled, planed on outside, properly jointed and glued, or dowelled and flagged. The diameter of the dowels shall not exceed 5/12 of the thickness of the head.

(i) STAVE JOINTS: All stave joints shall be flush on the outside. Latching is prohibited.

(j) DIMENSIONS OF PARTS: Staves, when finished on outside, shall conform to the dimensions of Table 1.

Heading after planing shall conform to the dimensions of Table 2.

(k) HOOPS: The number and size of hoops shall conform to Table 3.

Closures

(a) Any type of closure that prevents leakage may be used. If bungs are used, bungholes in staves shall not exceed 2″ in diameter.

Lining

(a) Lining shall be appropriate for the contents as specified by the purchasing officer (See Chapter on Linings).

Tests

(a) TYPE TEST: The sample container, at least two days old, shall not increase more than 10% on diameter of head when all hoops above bilge are removed.

(b) LEAKAGE TEST: This test is required for each lined container. Testing shall be done by applying air pressure of at least 5 pounds per square inch to container. Leakers shall be repaired and retested.

(c) MARKING: The instructions for marking as given below shall apply to all containers for shipping material and supplies for Government use.

Each shipping container shall be marked with the proper identification and marks, as required in "General Specifications for Packaging and Packing for Overseas Shipment" (Army Spec. No. 100-14A, Navy Spec. No. 39P16a). In addition, the date of manufacture should be located near the manufacturer's identification.

Table I.—Dimensions for Staves

Maximum Capacity of Container (Gallons)	Maximum Length (Inches)	Maximum Width (Inches)	Maximum Bilge Circle (Inches)	Minimum Number of Staves	Minimum Thickness* (Inches)
5	18	4	40	10	½
10	22	4½	50	12	½
15	24	4½	54	14	9/16
30	30	5	74	16	⅝
50	34	6	84	19	¾

*If staves are unfinished, thickness shall be increased 1/16 inch.

Heading after planing shall conform to the dimensions in table II.

Table II.—Dimensions for Heading

Capacity of Container (Maximum) (Gallons)	Maximum Number of Pieces	Maximum Diameter (Inches)	Minimum Thickness (Inches)	Minimum Width (Inches)
5	4	11	⅝	2
10	5	13	⅝	2
15	5	14	11/16	2
30	6	18	11/16	2½
50	7	21	1	2½

Hoops.—The number and size of hoops shall conform to table III.

Table III.—Dimensions for Hoops

Maximum Capacity of Container (gallons)	Minimum Number of hoops	MINIMUM SIZE OF HOOPS							
		Head		First Quarter		Second Quarter		Bilge	
		Width (In.)	Thickness (Gage)	Width (In.)	Thickness (Gage)	Width (In.)	Thickness (Gage)	Width (In.)	Thickness (Gage)
5	6	1⅛	19	1	19	......	......	1	19
10	6	1⅛	19	1	19	......	......	1⅛	19
15	6	1¼	18	1⅛	19	......	......	1¼	19
30	6	1½	17	1¼	19	......	......	1½	18
50	8	1¾	16	1½	18	1½	18	1¾	17

THE USE OF LININGS

General

Tight wooden barrels often are lined, or sized, to make them suitable for various products. "Lining" consists of coating the barrel with one of several substances. Common linings include glue, silicate of soda, paraffin, asphaltum and combinations of these substances. Various patent linings, made by lining manufacturers, glue manufacturers, the meat packers, the oil industry, the chemical industry and others also are available.

The primary function of a lining is to protect the contents of a barrel from contamination and leakage. If the barrel is not properly constructed, no lining can make it a good package. First, be sure that your barrels are satisfactory. Then, select the proper lining for the product you plan to pack. This is important. Some linings may impart taste, odor or color to edible products. Some linings are soluble in certain chemicals, or even in water. Be sure to get the right lining for your particular commodity. When you have the right lining, apply that lining in a careful and precise manner, with proper supervision and inspection. If these primary rules are followed, your linings should give satisfactory service.

Selecting the Lining

There is no hard and fast rule in selecting the proper lining for your product. A lining should never be chosen, however, without consulting your cooper or the lining manufacturer. For some products, any one of several linings may be suitable. Other products often require one specific lining. In first-class barrels made from certain woods, the unlined barrel will suffice for certain products, but the same barrel in a cheaper grade may require a lining for the same product. In general, however, trade practice has shown that these products can be packed as follows:

UNLINED BARRELS (*first quality cooperage*): Bourbon whisky (charred barrels), acids, extracts, fruit juices, vinegar, formaldehyde, wine, white oil, meats, beverage syrups, sausage casings, lard, grease, glucose, paste, sorghum, malt syrups, hot products and certain chemicals.

GLUE LINING: Certain acids, alcohol and alcoholic solvents, mineral oils, lacquers, paints, shellac, formaldehyde, certain chemicals, etc. (Note: Glue should not be used for any products containing a large percentage of water, as glue is soluble in water. Edible products generally should not be packed in glued barrels as glue often imparts a taste. Primarily glue lining used for alcoholic based products.)

SILICATE OF SODA LINING: Lard, shortening, molasses, vegetable oils, mineral oils, compounds, grease, sausage casings, meats, paints, food products, powdered chemicals, silicate of soda, tanning compounds, wax, white oil, caustic soda and the like. (Primarily all oil-based products.)

PARAFFIN LINING: Certain acids, beverages, diamalt, extracts, pickles, soft drink syrups, other syrups, vinegar, water, cider, condensed milk, catsup, food products, formaldehyde, fruit juices, sausage casings, sauerkraut, wine, liquid soap, preserves, malt syrup, compounds and certain chemicals. (Primarily all water-based products.)

APPLICATION OF LININGS

General

There are several general rules that apply in the application of all linings. First, they should be applied hot, and under pressure. Linings applied hot should be at a temperature of from 175 to 185 degrees F. Linings should be applied under pressure up to 5 pounds per square inch. Pressures beyond this point may damage the barrel. Pressures may be obtained by bunging up the barrel containing at least 2 gallons or more of hot lining compound to create vapor pressure. Machines to line barrels should line under pressure. Spraying a lining into a barrel without pressure is not satisfactory.

Lining With Glue

First, apply the usual test or wash coat of glue, under pressure, by bunging up the barrel. After the test coat has dried, apply the second coat liner as follows:

To a selected weight of glue, add an equal weight of water in the kettle—60 pounds of glue and 60 pounds of water will make approximately 10 gallons of glue solution. Bring the glue into solution by heating gradually to 180 degrees F., constantly stirring and keeping the solid and semi-liquid glue scraped off the sides and bottom of the kettle. When the glue is in solution, add slowly by sifting, with constant stirring, 3% of potassium aluminum sulfate, based on the weight of the solid glue in the solution. Potassium aluminum sulfate raises the viscosity of the glue. When the glue and potassium sulfate have been dissolved and well mixed, the mixture should be heated to 185 degrees F., at which time it is ready for lining. Put several gallons (at least 2 gallons) of the glue solution in the barrel, bung tightly with a rubber compression bung, and roll and tumble the barrel to make sure that the entire inner surface comes in contact with the glue solution. Then drain the excess glue back into the kettle, allowing plenty of time for draining, as glue drains slowly. When the barrel has been drained, place it, bung up, on the barrel drier which forces a gentle stream of air through the bung. Leave the barrel on the air drier until the glue has dried to a rubbery consistency and does not feel sticky.

Lining With Paraffin

Paraffin should be prepared for lining in much the same manner as glue, heating in a heating kettle to about 180 degrees F. To increase the plasticity of paraffin, and decrease the number of air holes, the addition of 10% of a petroleum micro-crystalline wax is recommended. Pour several gallons of the hot liquid into the barrel, bung up the barrel, then roll and tumble it as for glue. Allow the paraffin plenty of time to set. The heat in the bunged-up barrel furnishes the necessary pressure.

Lining With Silicate of Soda

To apply the test coat of silicate, dilute one volume of "N" brand silicate with three volumes of water. Heat the solution to 175 degrees F. or over and pour 5 gallons of the hot solution into the barrel, bunging it tightly. Roll or tumble the barrel as for glue, then drain the excess silicate back into the kettle.

For the lining coat, dilute seven or eight volumes of silicate with one volume of water, thus obtaining a solution measuring 37 degrees Be' cold or 35 degrees Be' at 200 degrees F. Heat the solution to 175 degrees F. or over and proceed with the lining in the same manner in which the test coat was applied. Here, again, the heat furnishes the necessary pressure.

Testing Linings

The barrel should be carefully tested and inspected when the test coat of a lining is applied. If there is any escaping steam or lining, correct the fault before proceeding. Plugging, driving of the hoops or caulking may be necessary. Barrels can be tested by filling with air under pressure and checking for leaks. A barrel that will hold 2 pounds of air per square inch without air leaks will hold liquids. Pressures beyond 5 pounds may damage the barrel.

Mechanical Lining

There are a number of machines on the market for lining barrels. Some of these machines simply spray the lining into the barrel. These do not provide a satisfactory coating job, unless the spraying is done under pressure. One coating machine has a pump which forces a half-gallon of hot lining into the barrel at each stroke. Other machines contain drying units and various refinements. Machines for tumbling barrels to distribute linings under the "bunging-up" method also are available. Your cooper can give you the names of manufacturers.

* * *

THE *Beer* BARREL

THE BEER BARREL

General

Two types of wooden beer kegs are manufactured . . . the solid wood type made from quartered white oak (Figure 54) and the laminated keg made from veneers bonded together, generally called plywood. The United States Government capacity specifications of a beer whole barrel is 31 gallons or 259 pounds, and the tax is based on this amount. Beer halves, quarters and eighths are the fractional parts of 31 gallons.

The wooden beer keg has always been considered the ideal package for a beer container. The wood serves as a very good insulating material, which keeps the beer at proper temperature during the time of transportation. Because of its shape, it is easily handled and stored; and any head or stave can be replaced when necessary. The pitch with which the keg is lined adheres readily to the wood.

Fig. 54

Care and Handling

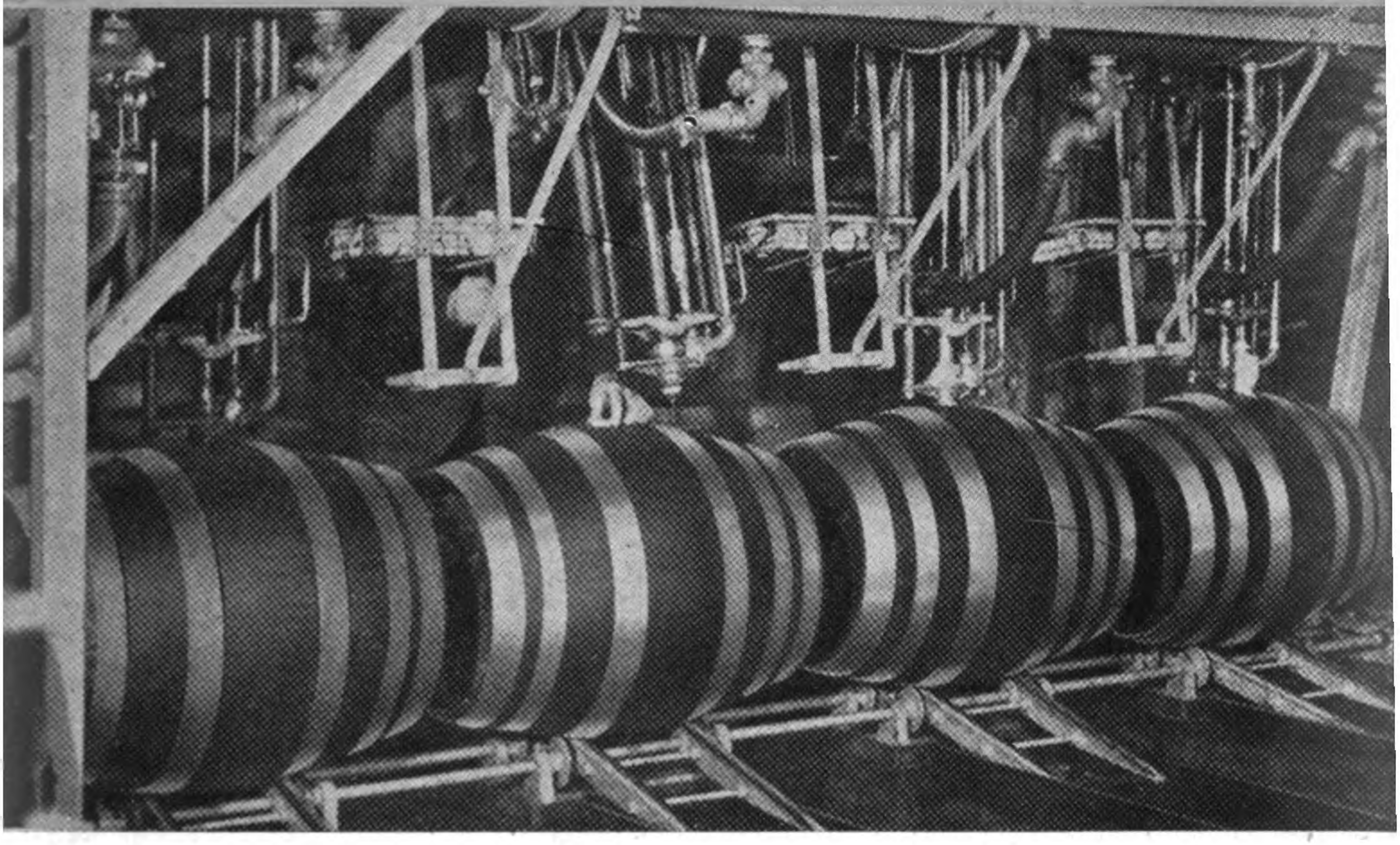
If proper care is exercised in handling and storing a wooden beer keg, it should last for at least 200 trips. If stored for any length of time, beer kegs should be kept in a cool place and the room closed up to prevent circulation of air from drying them out. If the floor is damp, strips of wood should be placed under the kegs. When the solid wood type has shrunk, they should be wet down with a fine spray of water until they have tightened up. The hoop driver should never be used except when absolutely necessary as it reduces the capacity of the keg and unless operated by a skilled operator, a great deal of breakage will occur.

Laminated Barrel Care

Laminated kegs should NOT be sprinkled or hoop driven . . . should it be necessary to soak them, the water should be applied on the inside of the keg only. Fill them with water. A number of breweries are now equipped to soak their kegs by filling them with water and maintaining a pressure against the water. This method is the ideal way and will reduce the soaking time to a fraction of the time that was formerly required.

BEER STAVE AND HEADING SPECIFICATIONS

A. TIMBER: Beer and ale staves must be rived or split from sound white oak timber, and be free from short crooks and seed holes. Two sound worm holes may show in a



prime piece, but 90 per cent of the pieces in any shipment must be free from such defects.

B. GRAIN: All pieces must be straight grained, or nearly so, and may be classed as culls if the grain appears to run in general across the width of the piece at an angle of over 45 degrees.

C. CHECKS AND KNOTS: Must be free from checks or knots of such a nature as to make them unfit for the purpose for which they were intended.

D. STREAKS: Staves may have black or red streaks on the inside, if they do not show through at any point between chimes, nor more than a quarter of an inch deep at end; on the outside if they do not show through at any point between chimes, nor more than a quarter of an inch deep at end.

E. WIDTH: The minimum width of whole barrel staves is to be 3¼", of half-barrel and quarter-barrel staves 2¾", and of shorter lengths 2½". Said measurements to be taken on back of stave at bilge, free of sap.

(For information on F. Basis of Sale, and G. Inspection, write to The Associated Cooperage Industries of America, Inc.)

H. DIMENSIONS: The following dimensions are for green stock and constitute a standard stave and a variation of one-sixteenth of an inch in thickness is allowed. Fractional variations in lengths of prime staves are permitted, provided not more than 20% of the pieces in any shipment are over ⅛" longer or over ⅛" shorter than the lengths specified in the established grading rules. Unless otherwise agreed to or specified between buyer and seller prior to shipment each carload of staves must actually average in width within 15 per cent of the average width specified in Paragraph "I" herein:

I. DIMENSIONS:

Size	Length	End Thick.	Bilge Thick.	Average Width	Length Shoulder
1/8	16½″	1¼″	1″	3½″	2½″
1/6	18″	1¼″	1″	3½″	2½″
1/4	20½″	1½″	1-3/16″	3¾″	3″
1/2	25½″	1⅝″	1-5/16″	4″	3½″
1/1	31″	1¾″	1-7/16″	4¼″	4″
Ale bbl.	34″	1⅞″	1-9/16″	4¼″	4¼″
Ale hhd.	40″	1⅞″	1-11/16″	4¼″	4½″

J. HEADING: Square beer heading: Unless otherwise specified at time of sale, must be flat sawn. The general classification as to grain and as to defects to be the same as specified on staves unless otherwise herein provided for.

Streaks in heading shall be allowed in prime quality only on one face and provided the same do not pass through over 1/3 of the thickness of the piece. Such streaks admitted in not over 10 per cent of the number of pieces.

K. HEADING SIZES:

Size	Length	Width per Set	Thickness
⅛	10½″	21″	1¼″
¼	13″	26″	1½″
½	16″	32″	1⅝″
1/1	18½″	37″	1¾″
Ale bbl.	19″	38″	2½″
Ale hhd.	23″	46″	3½″

L. MINIMUM WIDTH OF HEADING PIECES: The minimum width of heading pieces shall be 3″ of full specified thickness, clear of sap and wane, and the average width of any shipment shall be sufficient for the manufacture of circled heads with not more than the following number of pieces per set of respective sizes:

Size	Pieces per set
⅛	5 pieces per set
¼	7 pieces per set
½	8 pieces per set
1/1	8 pieces per set
Ale Barrel	8 pieces per set
Ale Hogshead	10 pieces per set

Fifty per cent of heading in any one shipment to not exceed:

Size	Pieces per set
⅛	5 pieces per set
¼	6 pieces per set
½	7 pieces per set
1/1	7 pieces per set
Ale Barrel	7 pieces per set
Ale Hogshead	9 pieces per set

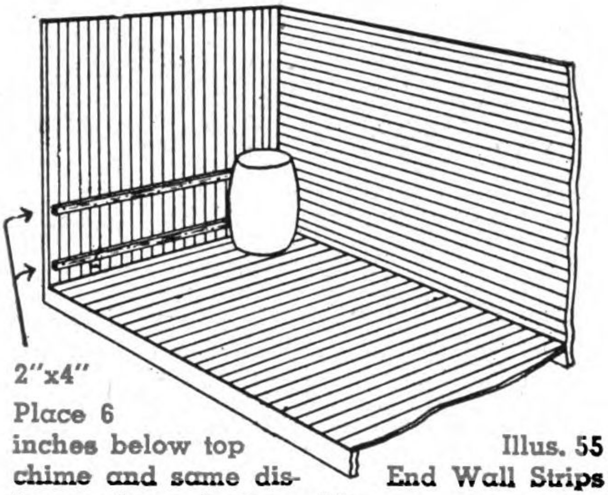
M. HEADING INSPECTION: The same regulations as to inspection of shipments shall govern as specified herein for stave shipments. (Par. G.)

N. WANE EDGES ON HEADING: In measuring widths of heading pieces, wane shall be included on not more than 2/3 of the total number of pieces in a shipment but only to the point where the piece shows ¾″ thickness on ⅛, ¼ and ½ barrel, and only to the point where the piece shows thickness of 1″ on 1/1 barrel pieces. On ale barrel heading no wane shall be included excepting to where piece shows a thickness of at least 2″ and in the case of Ale Hogshead heading 3″. In heading pieces of all sizes one sound knot may be admitted provided it does not exceed 1″ in diameter, shows only on one face of the piece and is not within 1″ of the finished joint or bead. This tolerance in knots is only admissible on up to 3 per cent of the number of pieces in any shipment.

Paragraph "G" to cover heading as well as staves.

(Note: Tolerances in dimensions of material not covered in these specifications are to be agreed upon between buyer and seller.)

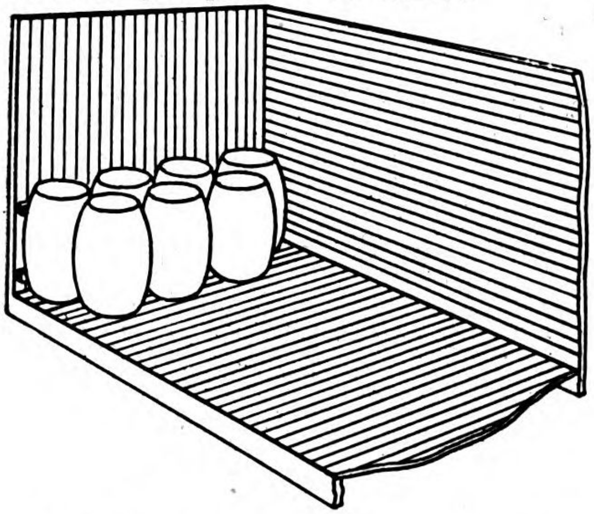
GENERAL BARREL INFORMATION



2"x4"

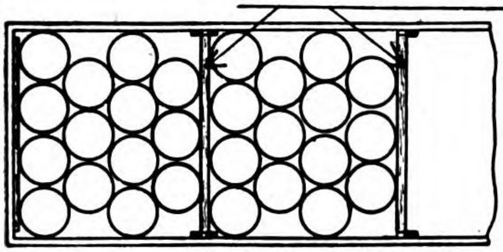
Place 6 inches below top chime and same distance above bottom chime, the strongest parts of the barrel.

Illus. 55
End Wall Strips

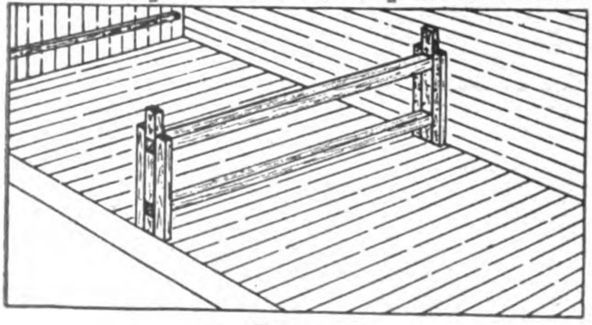


Illus. 56—Nesting of Crosswise Rows

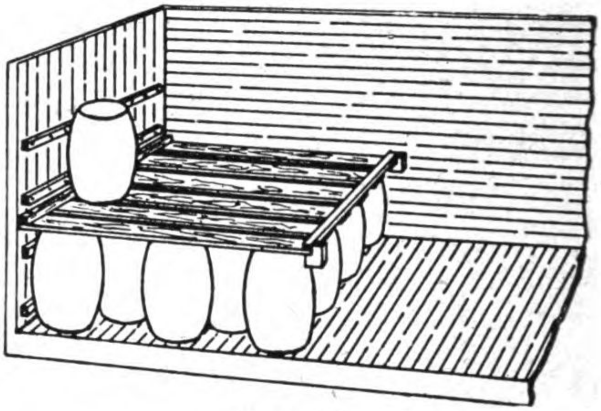
TWO CROSS BRACES -
ONE 6" BELOW TOP CHIME —
THE OTHER 6" ABOVE BUTTON CHIME



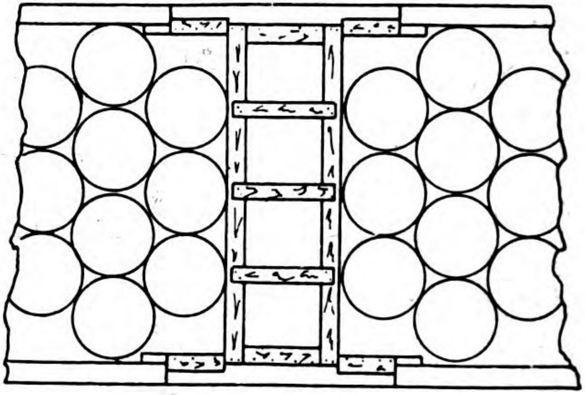
Illus. 57
Bracing of Units—Heavy Containers



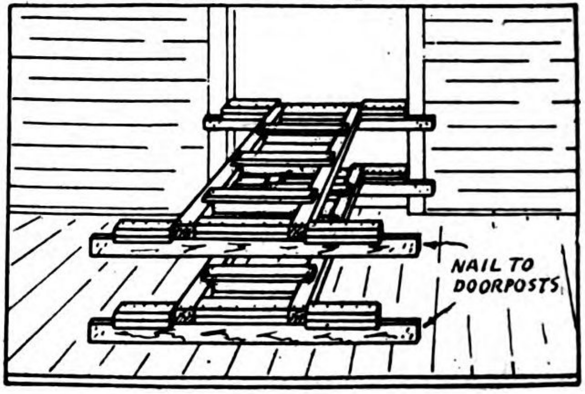
Illus. 58
Cross Braces Between Units



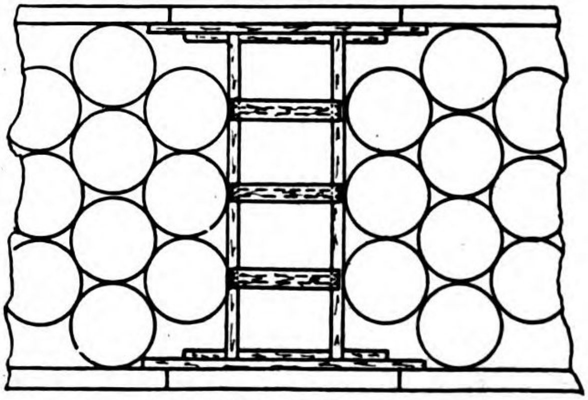
Illus. 59
Boards Between Layers



Illus. 60
Bracing—Doorway Area



Illus. 61
Detail of Illus. 60



Illus. 62
Bacing—Doorway Area

LOADING FOR RAILROAD SHIPMENT

General Rules

The Association of American Railroads has issued rules for the loading, bracing and blocking of carload shipments of commodities in barrels and kegs. Much of the material in this chapter was obtained from this source.

The Association has formulated the following rules for the purpose of providing safe methods of loading in closed cars, and the rules must be observed.

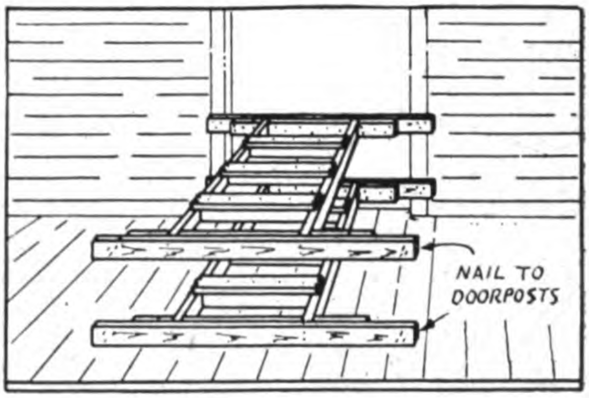
Lading must be so secured that it will not come in contact with side doors, or roll or shift in transit either horizontally or laterally. Shift of load is permissible when load is secured as a floating unit; however, in such instances the recommendations affecting individual commodities and termination of load at doorway must be adhered to.

Lading of a character requiring protection to prevent it falling or rolling out at doorway or coming in contact with door while in transit must have the prescribed stripping across the door opening.

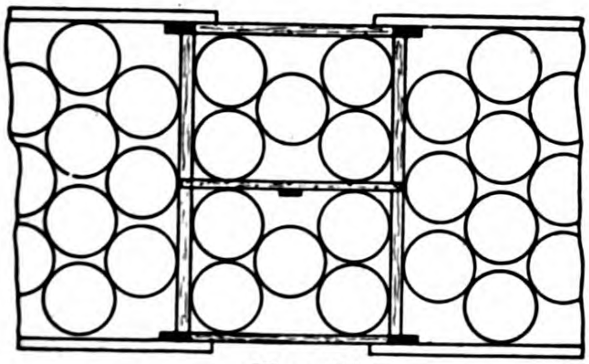
Doorway protection board, or metal ties, must be securely fastened flush with the inside of door posts (never on the outside) except as otherwise specified in these loading rules, or unless covered by Government classifications.

Size and strength of the material should depend on the weight and pressure of the load. Ties or boards should be placed sufficiently close to the floor of the car and to each other.

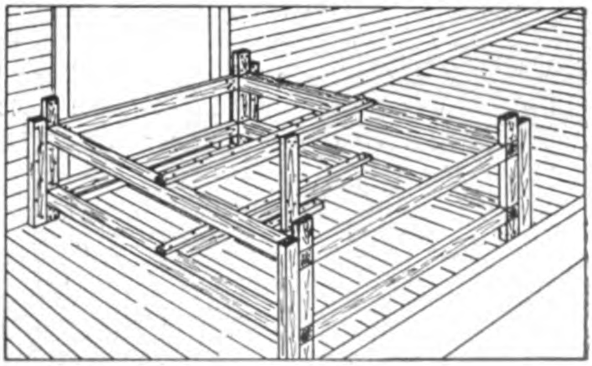
The load must be so placed in the car that there will not be more weight on one side of the car than on the other. One truck must not carry more than one-half of the load limit stenciled on the car. Cars should be loaded as heavily as possible up to but not exceeding the load limit stenciled on the car.



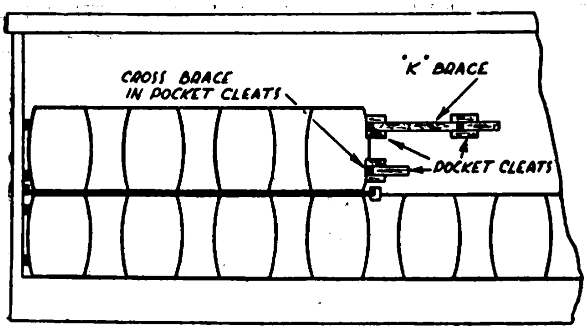
Illus. 63
Detail of Illus. 62



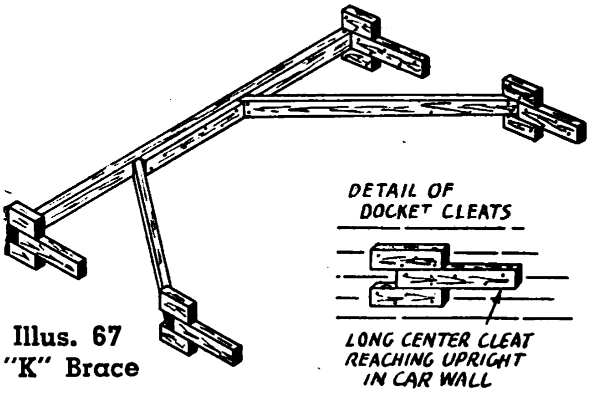
Illus. 64
Bracing—Doorway Area—Heavy Containers



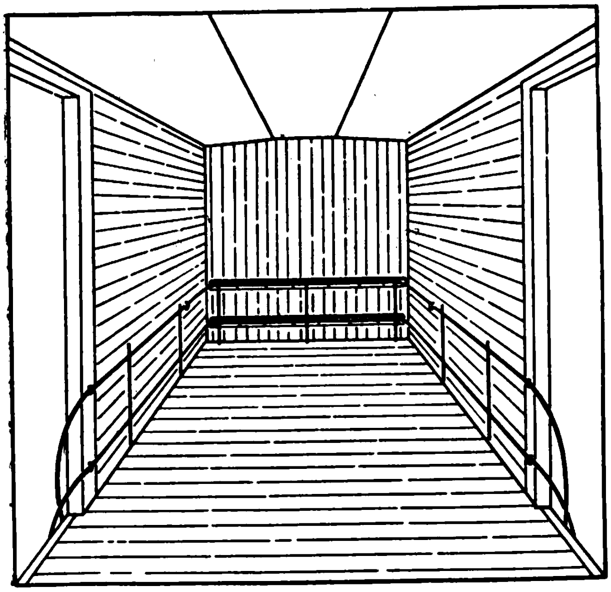
Illus. 65
Detail of Illus. 64



Illus. 66



Illus. 67
"K" Brace

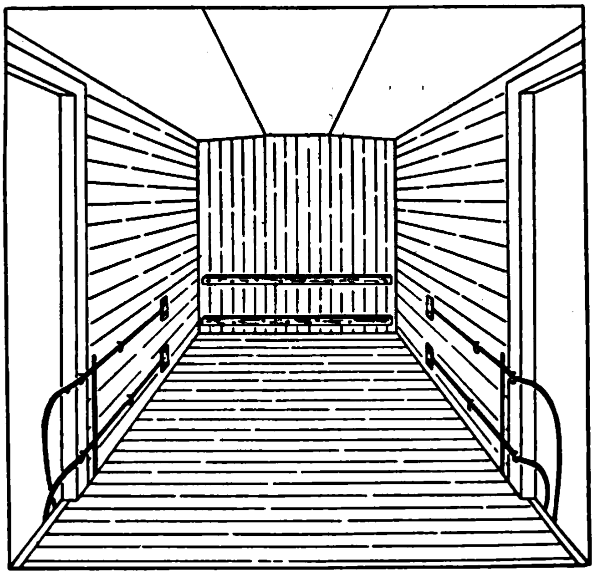


Illus. 68

End view of car showing metal ties temporarily stapled to car sides and end prior to start of floating load. Also note application of end wall strips.

Selection of Car

Cars selected for loading of barrels should be clean, have sound roofs, floors, sides and end walls, and should be free from protruding nails or other projections.



Illus. 71

View in one end of car prepared for anchored load showing ties securely fastened to uprights in car walls with anchor plates and temporary staples. Note stays near door posts. Two more to be applied to front of load before ties are tensioned and sealed.

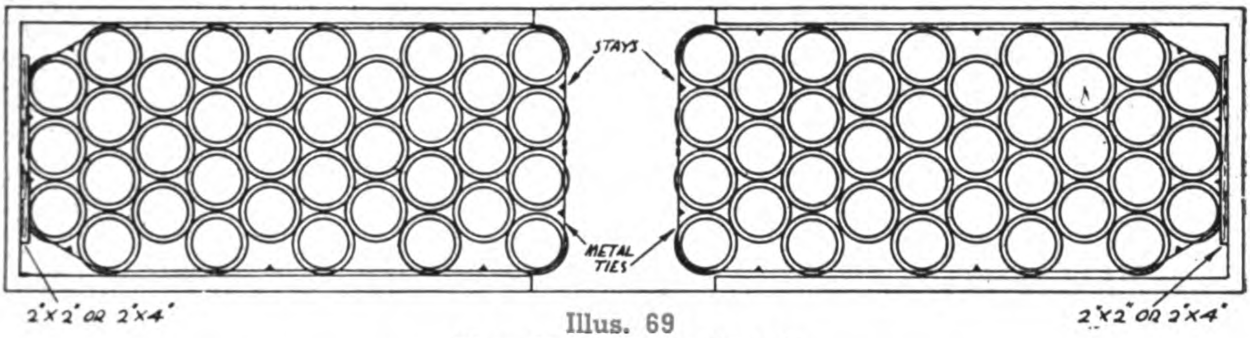
Barrels for Loading

Carefully examine each barrel before loading. If redriving or fastening of hoops is indicated, do so. If the product to be shipped is an explosive or a dangerous article, consult I. C. C. regulations.

Loading

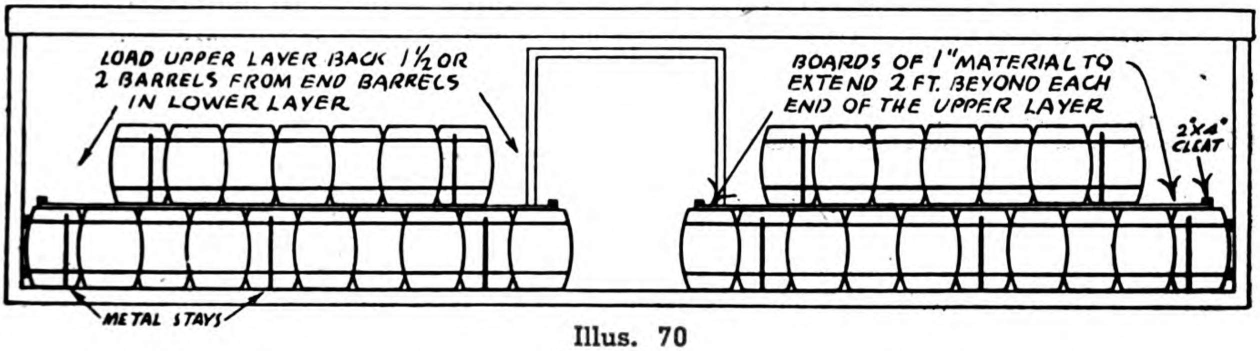
Ends of cars used for loading barrels must be prepared as shown in Figure 55. Two-inch by two-inch strips may be used in lieu of two-inch by four-inch strips. The application of these strips prevents contact of the weakest part of the barrel (the bilge) with the end wall, and places such contact above and below the bilge where greater strength in the barrel is present.

Load all barrels and kegs on end. Tight loading is important. Start the load against the end wall strips, being



Illus. 69
Plan View (Floor Layer)

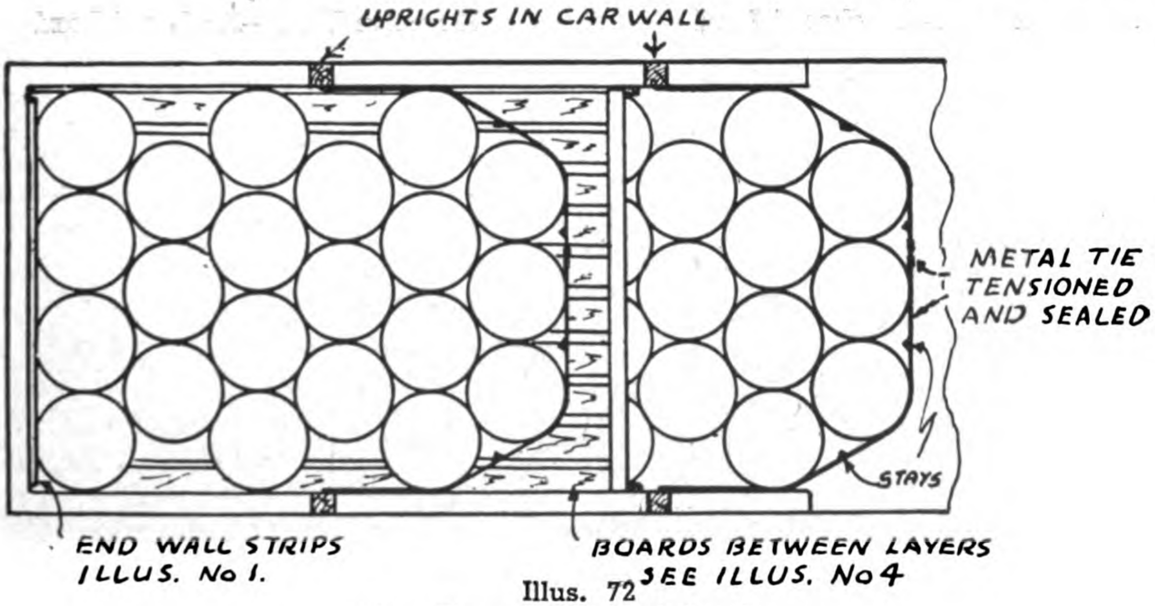
Load must be started against the end wall strips or 12 inches away from them according to the number of barrels to be loaded in car and floor space required. Load may start with 3 barrels and end with 3 or 4 barrels as shown.


LOAD UPPER LAYER BACK 1½ OR 2 BARRELS FROM END BARRELS IN LOWER LAYER
BOARDS OF 1" MATERIAL TO EXTEND 2 FT. BEYOND EACH END OF THE UPPER LAYER
2"x4" CLEAT
METAL STAYS

Illus. 70
Side View

sure to space the container properly across the car so that the straight crosswise rows will follow. With a rigid braced load, the containers at each end of the first row across the car can be placed in the corners of the car, touching both sides and end. Remaining containers in this row should be equally spaced. Nest the second crosswise row in the first and continue to load in this manner (Figure 56).

Heavy commodities must be loaded


UPRIGHTS IN CAR WALL
METAL TIE TENSIONED AND SEALED
STAYS
END WALL STRIPS ILLUS. No 1.
BOARDS BETWEEN LAYERS SEE ILLUS. No 4

Illus. 72
Plan View—Anchored Load

in more than one unit in each end of the car to distribute the weight and pressure against subsequent rows and doorway bracing. Each unit must be braced separately in position. (Figures 57 and 58.)

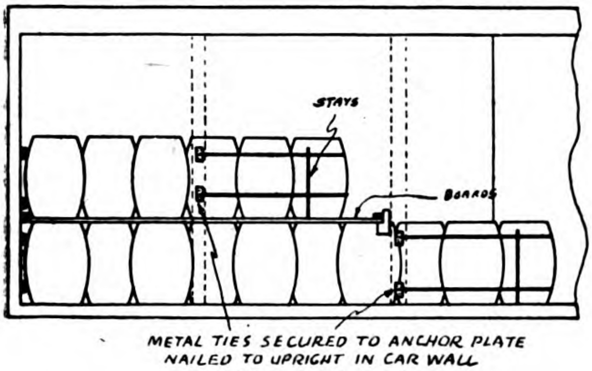
Boards of one-inch material must be placed lengthwise on top of the floor layer when a second layer of barrels is loaded. Similar boards must be used between subsequent layers (Figure 59). Note the use of cleats to keep the boards in line. End wall strips (Figure 55) should be used to protect each layer.

Wood Bracing and Blocking

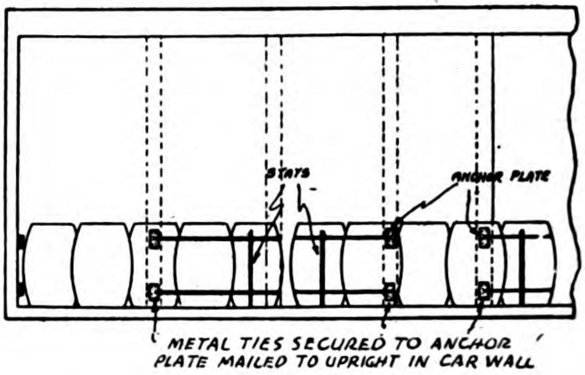
Use good quality lumber, free from knots, cross grain and other defects, and of sufficient dimension to adequately stay the load. Do not use lumber of less than two inches by four inches in cross dimension. Secure nailing is important. Use plenty of nails of sufficient size to hold. Bracing applied to side walls or ends of car should be nailed to the uprights where practical. Drive nails straight.

It is essential that all vacant space in the doorway area between the units in each end of the car be taken up with adequate bracing and blocking (Figures 60, 61, 62 and 63).

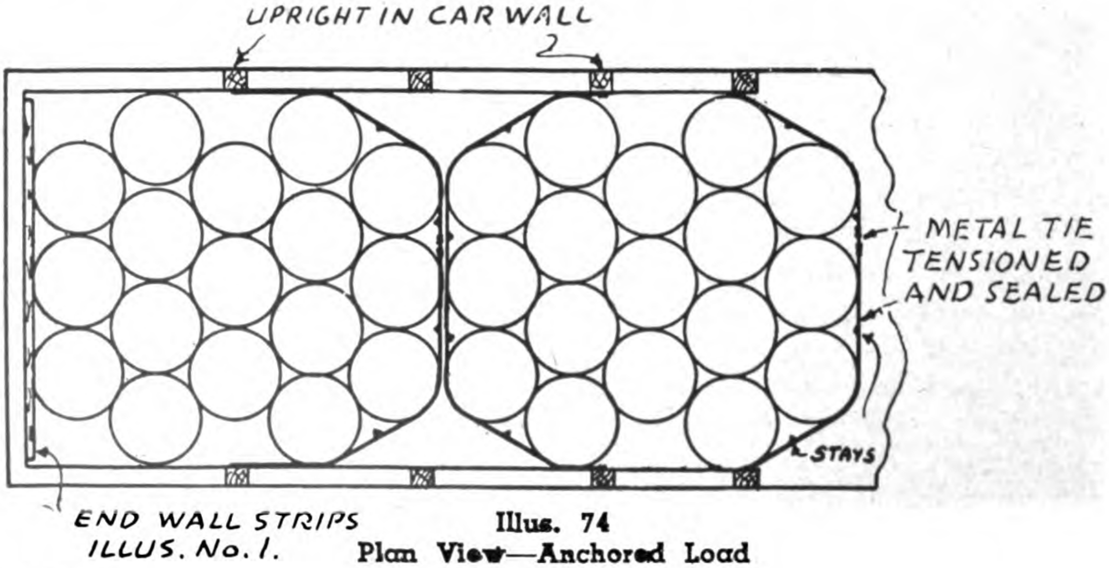
Heavy commodities loaded in several units as shown in Figure 57, must be cross-braced at door posts and a separate unit may be loaded in the


STAYS
BOARDS
METAL TIES SECURED TO ANCHOR PLATE
NAILED TO UPRIGHT IN CAR WALL

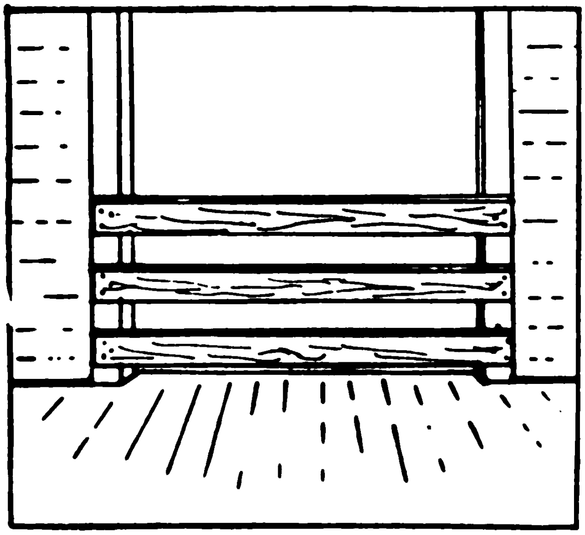
Illus. 73
Elevation View—Anchored Load


STAYS
ANCHOR PLATE
METAL TIES SECURED TO ANCHOR
PLATE NAILED TO UPRIGHT IN CAR WALL

Illus. 75
Elevation View—Anchored Load



Illus. 74
Plan View—Anchored Load



Illus. 76

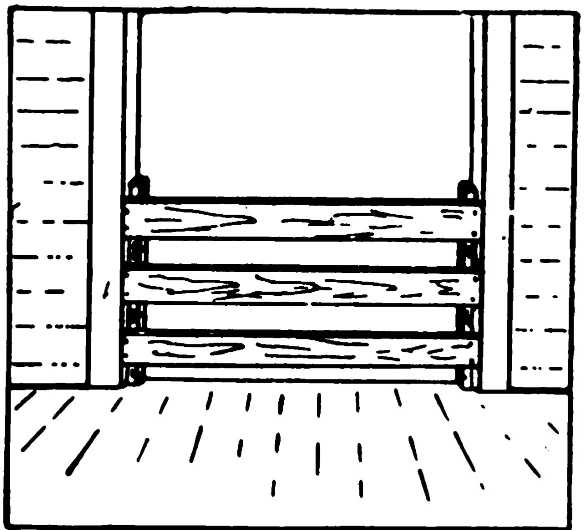
doorway area. Brace in doorway as shown in Figures 64 and 65.

Partial second layers must be protected with a K-brace as shown in Figures 66 and 67. Full second layers must be crib-braced in the same manner as floor layers (Figures 60, 61, 62 and 63).

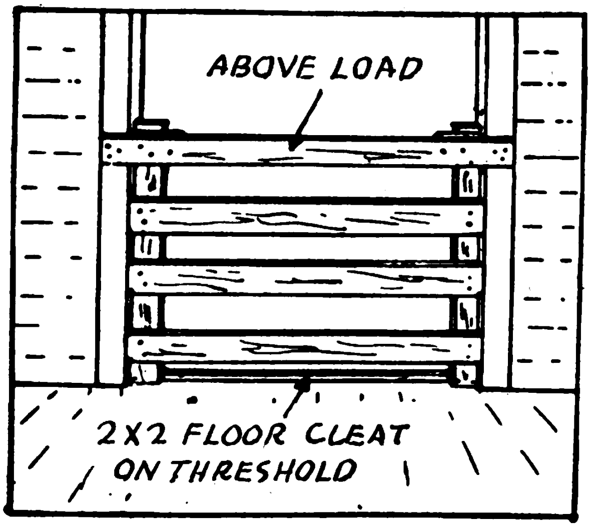
Metal Tie Loads

THE FLOATING LOAD. Metal ties should be temporarily draped around the car sides and end walls prior to the start of loading (Figure 68). End wall strips (Figure 55) must be used. Ties must be spaced so that they will contact the barrels above and below the bilge. They should be held in place through the use of metal or wire stays. A sufficient number of stays should be used to insure that the bands or wires will not drop down if the load loosens up. Metal bands used as ties must be of a dimension of at least ¾ inch by .030, with a tensile strength per band of not less than 2,000 pounds. Wire ties must be eight-gage, with a minimum tensile strength of 2,000 pounds per strand. The load must be started against the end wall strips or 12 inches away from them, according to the number of barrels to be loaded in the car and the floor space required. Continue loading in the same manner as previously explained. On completion of loading, the ties must be drawn around the unit in each end of the car, then tensioned and sealed or twist-tied (Figures 69 and 70). Under no condition should the second or subsequent layers be rigidly braced when the floor layer is tied as a floating load.

ANCHORED LOAD. Containers should be loaded and protected at end walls as previously described. With this method of loading, metal ties should be used instead of wood bracing. The anchor plates to which the metal ties are fastened must be nailed securely to the uprights in the car walls, and not to the sheathing (See Figure 71). Note the use of upright stays to keep the ties in position. Ties must be tensioned and sealed, or twist-tied, on completion of the loading (Figures 72 and 73). Second or subsequent layers must be loaded on boards (Figure 59) and secured in the same manner as floor layers.



Illus. 77—Flush Doorway Protection for Cars with Wooden Doorposts.



Illus. 78
Flush Doorway Protection for Cars with Steel Jacketed Doorposts.

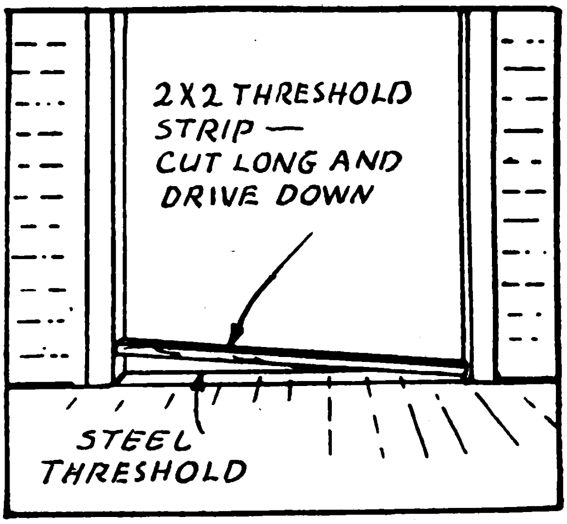
Metal bands used as ties must be of a dimension at least 1¼ inches by .035 inches, and with a minimum tensile strength of not less than 4,000 pounds. Wire ties must be eight-gage with a minimum tensile strength of 2,000 pounds per strand, and they must be used in pairs to obtain the same tensile strength as required of metal bands.

Heavy commodities separately braced in more than one unit must be secured as shown in Figures 74 and 75. The end unit must be tied and tensioned in the usual manner. Start the unit by loading tightly against the end wall strips. When the load in unit is completed, the front metal ties should be tensioned and sealed, making a compact unit.

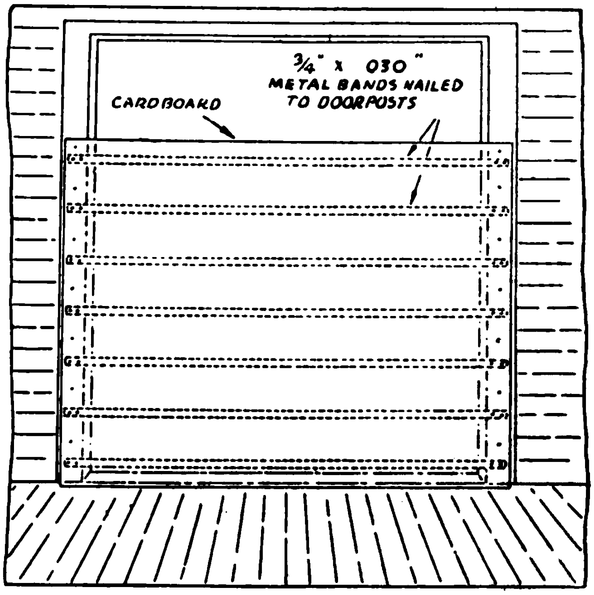
Metal ties for the next unit must be anchored to the uprights in the car wall so that they may be applied to the front and rear of this unit. (Figures 74 and 75).

Doorway Protection

Doorway protection must be applied to prevent the lading from coming in contact with the door when the load extends into the doorway area, except when the load is secured with metal ties. Doorway boards, when used, must be not less than one inch thick by six inches wide, sound, straight-grained lumber, placed sufficiently close to the floor of the car and to each other to prevent the lading from falling or rolling out of the car or coming in contact with the door. Metal ties may also be used, in which case they must be not less than ¾ inches by .030 inches, with a tensile strength of 2,000 pounds. (Figures 76, 77, 78, 79 and 80).



Illus. 79
Steel Threshold-Wedging in 2"x2" Cleat Shown in Illus. 78.



Illus. 80
Metal Tie Doorway Protection

TOOLS

General

Every firm that ships or receives products in wooden barrels, either tight or slack, should have a few simple tools to facilitate the opening, closing and repairing of cooperage.

Tight Barrel Tools

1. A cooper's hammer (Figure 1)—This is used for driving hoops on barrels, to pound rivets and for many other purposes.

2. A hoop driver—This can be either an oval type driver (Figure 2) or a hammer type driver (Figure 3). It is used for driving or tightening the hoops, or for loosening and removing the hoops.

3. A bung starter (Figure 4)—This is a wooden mallet used for tapping the bungstave to remove the bung.

4. A bung chisel (Figure 5)—A small, chisel-like tool used for removing bungs which resist the bung starter, or

5. A bung pick (Figure 6)—Used for the same purpose as a bung chisel.

6. A cooper's adze (Figure 7)—An adze used for driving and trimming bungs, whittling plugs and other purposes.

7. A head raiser (Figure 8)—A tool used for removing the heads from barrels.

8. An auger or borer (Figure 9)—To bore vent holes in barrels.

9. A ring punch (Figure 10)—To enlarge worm holes or other small holes so that they can be properly plugged.

10. A chime maul (Figure 11)—To drive the head hoops on a barrel without injuring the ends of the staves.

11. A flagging iron (Figure 12)—For flagging joints. Can also be used for removing heads.

The above are the standard tools which can be utilized to advantage by any plant handling tight barrels. Consult your local cooper as to what tools to buy, where to buy them and how to use them. He will be glad to give you the information.

Slack Barrel Tools

1. Cooper's adze (Figure 1)—To drive hoops on slack barrels, or

2. Oval type driver (Figure 2)—For the same purpose, or

3. Hammer type driver (Figure 3)—For the same purpose, or

4. Shoe driver (Figure 13)—For driving wood or wire hoops. (In ordering a hoop driver, be sure to specify that it is for slack cooperage, and whether it will be used for steel, wire or wood hoops.)

5. Catch ring (Figure 14)—Used for holding the staves together when the head hoop is removed to open the barrel.

6. Chime maul (Figure 11)—To drive the head hoops on a barrel without injuring the ends of the staves.

7. Bag liner inserters (Figure 15)—Round devices used for inserting bag liners in barrels. Often can be borrowed from the liner manufacturers.

8. If you are a fairly large user of slack barrels, it may pay you to buy an automatic stapler (Figure 16).

Before buying cooperage tools, consult your local cooper. He will be glad to tell you what to buy, where to buy it and how to use it.

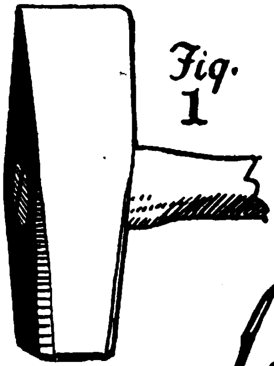


Fig. 1

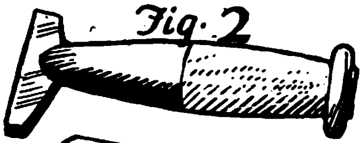


Fig. 2

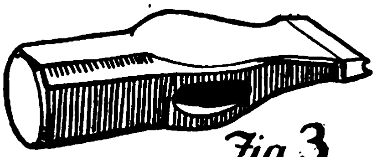


Fig. 3

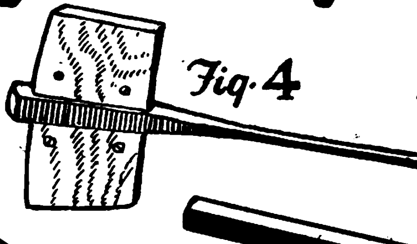


Fig. 4

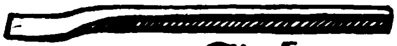
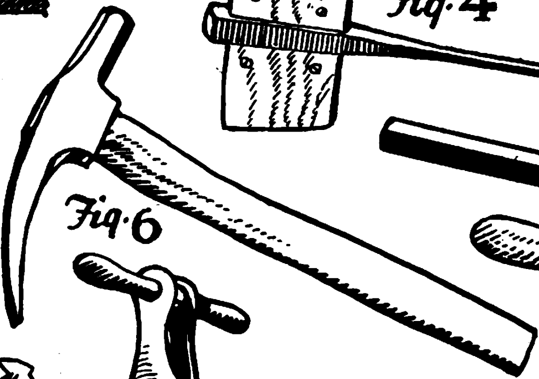


Fig. 5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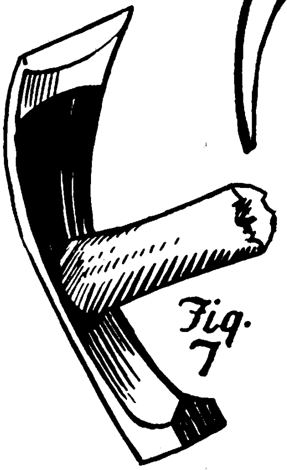
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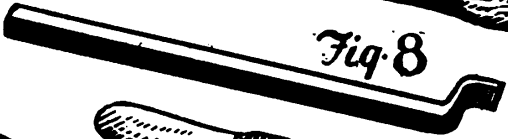
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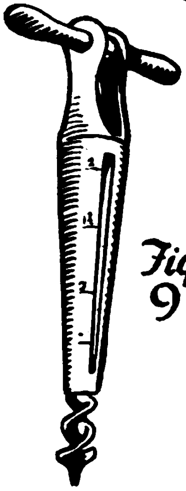
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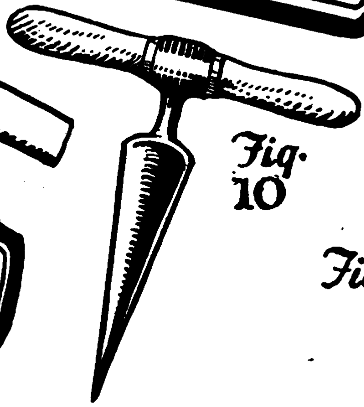
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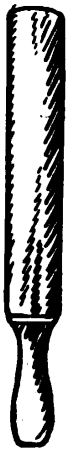
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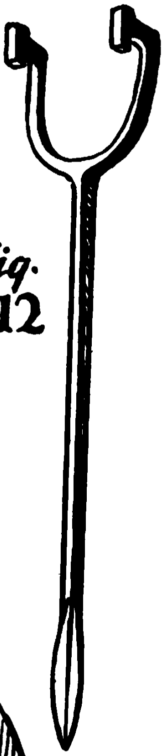
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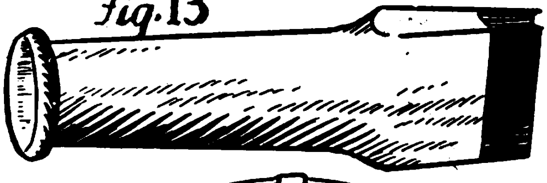
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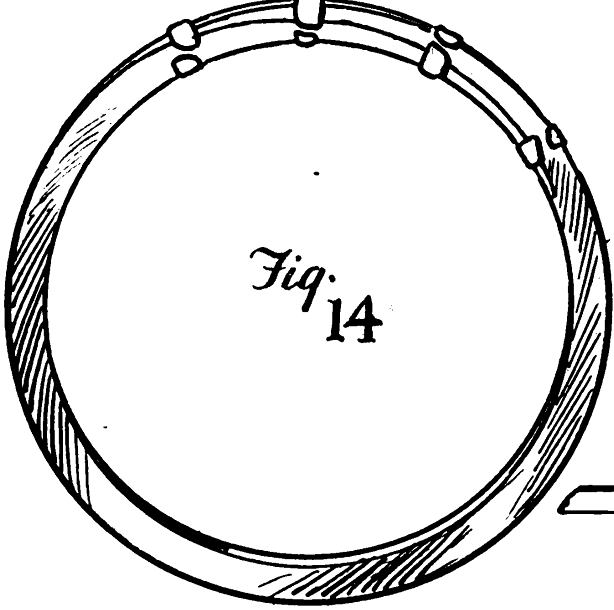
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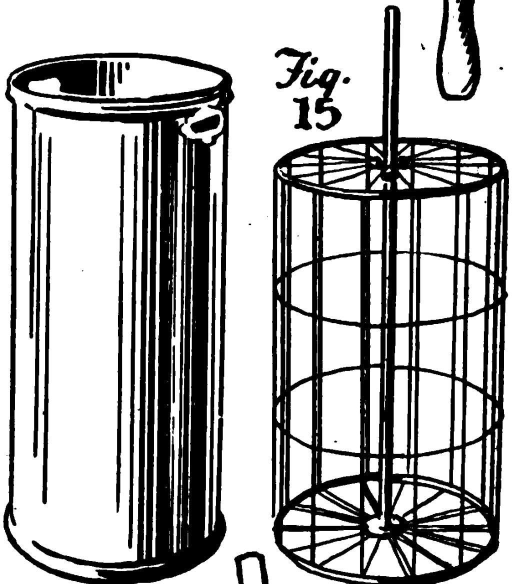
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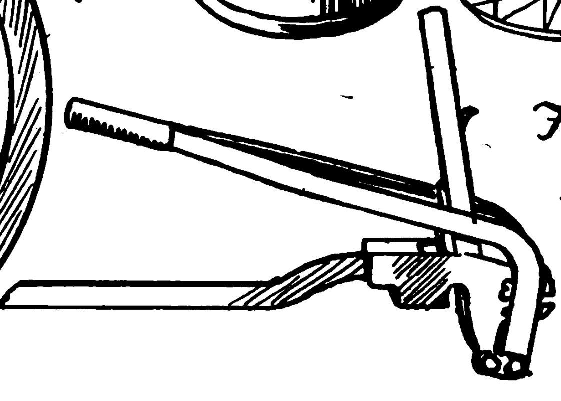
Fig. 16

MEASUREMENTS AND CAPACITIES

General Rules

There are several methods of finding the capacity of wooden barrels. Perhaps the easiest one, although not the most exact, is the following:

First, measure the inside diameter of the barrel at the inside of the head. Second, measure the inside diameter of the barrel at the bilge, or center. Add these two diameters and divide by 2 to obtain the average diameter. Square the average diameter (multiply it by itself). Then multiply this by 0.7854. Multiply the result by the inside height (the distance between the inside surfaces of the two heads), and the answer will be the number of cubic inches in the barrel. To convert the cubic inches to gallons, divide by 231.

EXAMPLE:

Head diameter
inside bilge ....18″
Bilge diameter
inside bilge ....22″
——
40″
40″ divided by 2 equals 20″
20 x 20 equals 400
400 x 0.7854 equals ....314.1 sq. in.
314.1 x 28″ (length inside)
equals ....8794.8 cu. in.

Another formula for figuring capacity is that used by the Bureau of Standards of the U. S. Department of Commerce and the U. S. Department of Agriculture. Here it is:

$V = 0.7854\ h\ (d + 0.65\ (D - d)\ )^2$
V = Volume
h = Distance between heads
D = Internal diameter at bilge

If extreme accuracy is necessary in figuring capacity, use the following formula:

V = Volume of barrel in cubic inches
$V = \frac{\pi}{12} h\ (2D^2 + d^2)$
$V = .2618h\ (2D^2 + d^2)$
h = height between heads
D = inside diameter at bilge
d = inside diameter at head
$D = \frac{C}{\pi}$ minus twice the thickness of a stave
d = diameter of heading minus thickness of portion of head that fits in croze
C = outside bilge circumference

Still another method of finding barrel capacity may be employed. Place the empty barrel on a scale and find its tare weight. Then fill it quickly with water up to the croze and weigh it again to find the gross weight. Subtract the tare from the gross, and you have the weight of the water in the barrel. A gallon of water weighs 8.33 pounds.

Rules Relating to Circle

In figuring barrel capacity, these rules relating to the circle may come in handy:

To find circumference:
Multiply diameter by..............3.1416
Or divide diameter by............0.3183

To find diameter:
Multiply circumference by ...0.3183
Or divide circumference by..3.1416

To find the area of a circle:
Multiply circumference by ¼ of the diameter.
Or multiply the square of the diameter by.............0.7854
Or multiply the square of the circumference by 0.7958
Or multiply the square of ½ the diameter by............3.1416

SLACK BARREL MEASUREMENTS

(Approximate)

Head Diameter and Stave Length	Distance Between Heads	Outside Bilge Circumference	Cubic Inches	Approximate Gallonage
12½ x 21	19	47.25	2793	12.09
14⅛ x 24	21.25	54.125	4116	17.82
15½ x 24	20.875	59.5	4912	21.27
15½ x 26	22.75	58.5	5447	23.58
15½ x 30	26.875	62.625	6845	29.63
17⅛ x 24	20.5	65.375	5875	25.43
17⅛ x 28½	25.375	65.625	7314	31.23
17⅛ x 30	26.75	68.00	8148	35.27
17⅝ x 30	26.50	70.625	8682	37.58
18¼ x 24	20.5	70.00	6753	29.23
18¼ x 28½	25.5	68.5	8121	35.15
18¼ x 30	26.25	72.00	9031	39.10
19⅛ x 30	26.875	74.75	10016	43.36
19⅛ x 32½	29.75	74.875	11112	48.12
19⅛ x 34	30.75	76.00	11760	50.91
20 x 30	26.5	77.00	10580	45.80
20 x 34	30.375	78.625	12525	54.26
22 x 32	29.00	84.00	13897	60.16
22 x 34	30.25	85.00	14762	63.90

TIGHT BARREL MEASUREMENTS

(Approximate)

The measurements for tight barrels vary according to the individual manufacturer. Some manufacturers use large heads and short staves to achieve a given capacity; others use smaller heads and longer staves to gain the same capacity. A tight barrel of any specific gallonage; i. e., 10, 20, 30, 50 gallons, has an additional capacity, or overage, of about 5% of stated capacity to allow space for expansion of the product. A typical measurement table for tight barrels follows:

Head Diameter and Stave Length	Distance Between Heads	Outside Bilge Circumference	Cubic Inches	Approximate Gallonage
10⅜ x 17½	15	38½	1091	5
12½ x 21⅜	18¾	47½	2182	10
14⅝ x 23⅜	20½	55	3273	15
16 x 23⅜	20½	60	4364	20
16½ x 29½	27⅛	62½	5455	25
17¾ x 29½	27⅛	67½	6546	30
21⅜ x 33¼	30⅜	80	10910	50
21⅝ x 35¼	32⅛	83	12436	57

DICTIONARY OF COOPERAGE TERMS

AGITATOR—A machine used to shake and jolt barrels so that the maximum contents may be packed.

BARREL — A bulging cylindrical container, of greater length than breadth, made of wooden staves bound together with hoops and having two flat ends or heads of equal diameter.

BARREL, SLACK—A barrel used for the shipment and storage of powders, semi-solids and solids.

BARREL, TIGHT—A barrel used for the shipment and storage of liquids, semi-solids and heavy solids.

BARREL, BEER — A barrel used for the shipment, storage and dispensing of malt beverages.

BARREL, BOURBON — A barrel made of first-quality white oak, charred on the inside, used for the storage and ageing of whisky.

BEAD—The outside edge of circled heading which fits into the croze of the staves.

BECK IRON—A piece of iron (sometimes a short section of railroad track) used as an anvil in clinching nails or rivets in cooperage.

BEVEL — The slanting portion of the outside edge of circled heading.

BILGE—The bulging, curved part of the barrel equa-distant from each head.

BIRD PECKS—Defects in timber, resembling a small knot, caused by the pecking of birds.

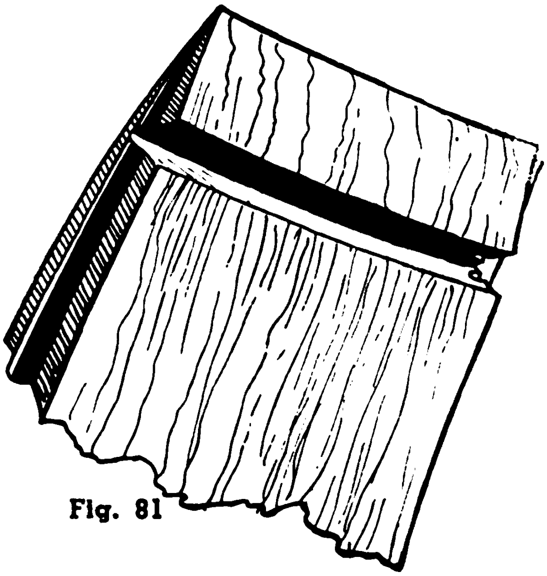

Fig. 81

BOLTS, STAVE—Blocks of wood, sawed or split to size, out of which staves are made.

BREAKER, WATER — A small wooden keg, used to hold water, often for life boats and life rafts.

BUNDLED—"Bundled" staves are staves tied up with wire in sets.

BUNG—A plug used for closing the bunghole in a barrel.

BUNG-BORER—An auger used to bore bungholes in a barrel.

BUNGHOLE—An opening in the barrel, through which liquids can be filled or emptied.

BUNG-FASTENER — A short metal strip, with prongs at each end, which is fastened to a barrel across the bung to hold it in place.

BUNG PICK — A hammer-shaped tool with a sharp point, used to remove bungs from barrels.

BUNG CHISEL — A tool shaped like a chisel, used for removing bungs from barrels.

BUNG SPOUT — A metal lip attached to a clamp to be fastened to the bunghole of a barrel for guiding the flow of liquids when emptying.

BUNG STARTER — A wooden mallet used for tapping on bungstave to loosen bung.

CANT—A single outside piece of a multiple-piece head.

CASK—A large barrel.

CATCH-RING — A wooden hoop used to hold the staves of a slack barrel together after the head hoop has been removed.

CAT FACES — Defects in timber, resembling small knots, but larger than bird pecks.

CHAMFER—The sloping ends of a stave.

CHECKS—Splits or cracks in bolts, staves or heading.

CHIME—That portion of the stave between the croze and the end of the barrel.

CHIME HOOKS—Hooks used to grasp and lift a barrel by the chime.

CHIME MAUL — An iron or wooden tool used for driving head hoops to prevent injury to the ends of the staves.

CHINCING IRON — A tool used for wedging coopers' flag between the head and staves after the head is set.

CLEATS—Wooden or metal strips fastened across the head of a barrel to strengthen it.

COOPER—One who makes or repairs barrels.

COOPERAGE — Containers made of staves and bound together with hoops, such as barrels and kegs; also the plant in which these containers are made.

CROZE—A groove near the ends of the staves into which the head of the barrel fits (Figure 81).

CULLS—Defective pieces of staves or heading.

CUT-OFFS—Short pieces of staves and heading made by sawing off the defective end of a standard piece.

DOG GRADE—Staves with defects so that they will not grade up to No. 2 stave standards.

DOWEL PINS—Small, round wooden pegs used to pin heading pieces together.

FIRKIN — A small wooden cask usually used for butter.

FLAG—A rush or cattail, which, when dry, is used for caulking the joints of heading, and sometimes for caulking barrel joints.

FLAGGING IRON — A tool used for caulking barrel joints with flag; also used for removing barrel heads.

GATE—A device used for guiding liquids emptied from the bunghole of a barrel.

HACKLEBACK — A stave which has not been trimmed.

HEAD—A circular piece fitted into the croze of the staves, to form the ends (top and bottom) of a barrel.

HEAD-LINER—A curved strip of wood, fastened around the inside of the chime of a barrel, just above the head, to keep the head from slipping out of the croze and to give the barrel additional strength.

HEAD RAISER — A metal tool used to remove the head from a barrel.

HOGSHEAD — A large wooden barrel or cask, usually of more than 60-gallon capacity.

HOOP—A circular band, of metal, wire or wood, used to hold the staves of a barrel together.

HOOP, BILGE — The two hoops nearest the center of a barrel.

HOOP, HEAD — The two hoops nearest the ends (top and bottom) of a barrel.

HOOP, QUARTER — The hoops between the head hoops and the bilge hoops.

HOOP-DRIVER—A tool used for driving the hoops on barrels to make them tighter.

HOOP FASTENER—A small, nail-like device, with a point on one end and an arm on the other, which is driven into the barrel next to or through the hoops to keep the hoops from moving or "crawling."

HOOPING-UP — The process of putting and tightening the hoops on a barrel.

HOWEL—The portion of the stave which has been hollowed out to cut the croze.

JOINTED — Staves and heading pieces which have been smoothed on the edges ready to fit into a barrel.

KEG — A small barrel (in trade practice, usually any barrel of under 30-gallon capacity).

KILN-DRIED—A term applied to staves and heading which have been artificially dried in a kiln to a lower moisture content.

KNOTS—Round, hard defects in timber.

LATHED—Term used to describe a barrel that has been planed smooth on the outside.

LINERS — Bags used inside of barrels to protect the contents from moisture and contamination.

LININGS—Liquid coating applied to the inside of barrels to make them liquid-tight.

LISTED — Term applied to staves and heading which have had the bark and other edge defects removed.

RACKS—Devices used for storing barrels.

RICK — A term applied to bolts piled up to be measured.

RING PUNCH—A tool used for enlarging holes in barrels so that they may be properly plugged.

SAP CLEAR — A term applied to staves and heading which have all of the sapwood removed.

SAP FREE—Same as "sap clear."

SAP ON—A term applied to staves and heading with the sapwood left on.

SAPWOOD—The porous wood between the bark and the heart of a tree.

SEED HOLES—Small holes made in wood by seed worms or borers.

SHOE DRIVER—A type of hoop driver widely used for driving wooden or wire hoops.

SHOE PEGS — Small wooden pins used for plugging small holes in barrels.

SHOOKS — Barrels knocked down and packed in bundles, often for export shipment.

SPIGOT—A faucet used to regulate the flow of liquids from the bunghole of a barrel.

SPILES — Small wooden pegs or plugs, used to close vent holes in barrels.

STAPLER — A device for driving staples into a barrel to secure the hoops or cleats.

STAVE—An arched vertical piece forming the walls or sides of a barrel.

STAVES, AIR DRIED AND LISTED (AD&L)—Staves that have been dried in the open air and have had the edge defects removed.

STAVES, KILN-DRIED AND JOINTED (KD&J) — Staves which have received artificial drying in a kiln down to proper moisture content and whose sides have been smoothed and shaped ready to fit into a barrel.

STAVES, BUNDLED — Staves which have been tied into bundles of sets to make barrels.

STAVES, RIVED — A stave split from straight-grained timber with a wedge.

STAVES, SPLIT — Same as rived staves.

STAVES, BUNG — The staves in which the bunghole of a barrel is bored.

STOCK — The material used to make cooperage; staves and heading.

TIERCE—A barrel or cask, often used for lard.

TIGHT SAP—A term used to denote sapwood which is closely pored.

TONGUED AND GROOVED—Staves or heading pieces which contain a rib on the edge of one piece to fit into a groove on the edge of the adjacent piece, to make a flush joint.

TRUSS HOOP—A heavy hoop or ring used to hold the staves together while the barrel is formed.

VENT HOLE—A small hole bored in a barrel to allow air to escape to facilitate the pouring of liquids.

WIND SHAKES — Timber split while growing, often due to a heavy wind.

WOOD WANT—A term applied to a slight slope or wane on the edge of finished staves and heading which does not leave the stock full thickness.

WORM HOLES—Holes in timber made by small worms.

The
ASSOCIATED COOPERAGE INDUSTRIES OF AMERICA, Inc.

History

The national trade association of the cooperage industry, both tight and slack, was founded in 1915 by the consolidation of several group associations then in existence.

In 1915, the National Coopers Association (founded in 1899) was joined by the Tight Barrel Stave Manufacturers Association (founded in 1888) and the group adopted the name of The Associated Cooperage Industries of America. The next year, in 1916, the National Slack Cooperage Manufacturers Association (founded in 1899) joined the fold.

Guided throughout the 28 years of its history by officers elected from the membership by popular vote, the Association has been a power in improving the quality of cooperage.

Purpose and Scope

The Association consists of manufacturers and dealers in tight, slack and beer barrels; manufacturers and dealers in staves and heading, hoops, cooperage machinery and supplies.

The main purpose of the Association over the years has been to improve the quality of cooperage. Grade rules and specifications were drafted to insure quality to the buyer; codes of business ethics and rules of sales and settlements govern the dealings of its members. Only reputable, dependable firms are admitted to membership.

If you have any questions regarding cooperage, or if you want to know where to obtain wooden barrels and kegs, write:

THE ASSOCIATED COOPERAGE INDUSTRIES OF AMERICA, Inc.
408 Olive Street St. Louis 2, Mo.

Compiled by F. P. HANKERSON, Executive Secretary,
The Associated Cooperage Industries of America, Inc.

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